

Field Service Guide for the NetApp F500 Series

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- To reduce the risk of personal injury or damage to the equipment, ensure that the equipment is properly supported or braced when installing options.
- This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- This equipment is furnished with one or more lithium batteries. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Do not attempt to recharge the battery, disassemble it, or dispose of it in a fire.

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Preface

About this guide

This guide provides you with the field service procedures for replacing, upgrading, and maintaining hardware units in the NetApp™ F500 series filers. Use this guide after you have familiarized yourself with the system hardware by reading the *Hardware Guide for the NetApp F500 Series*. This guide is organized as follows:

Chapter	Information included in the chapter
1	Overview of the field replaceable units and list of tools required for servicing the filer
2	Procedure for replacing the system board
3	Procedure for replacing the expansion cards
4	Procedures for replacing storage devices
5	Procedures for replacing power supply and fans
6	Procedure for replacing LCD control panel

Use this guide in conjunction with the *System Administrator's Guide*, which describes how to operate and manage the filer, and the *Hardware Guide for the NetApp F500 Series*, which describes initial system installation.

Audience

This guide is for system administrators and Network Appliance field service personnel who are familiar with the operation of the NetApp F500 series filers. To perform the procedures in this guide, you must have the following skills and experience:

- working familiarity with small computer system hardware and operation
- basic understanding of common networking concepts and practices
- working familiarity with accepted tools and procedures for installing and operating sensitive electronic equipment

Terminology

The term “filer” applies to all models of the NetApp F500 series.

The term “FDDI network card” refers to a network card that can be connected to a Fiber Distributed Data Interface (FDDI) network, whether the cable supported is a fiber-optic or twisted-pair cable. To distinguish between the FDDI cards with different media types, this guide uses the terms “FDDI-fiber” and “FDDI-TP.”

Command conventions

You can enter filer commands on the system console or on an administration host, which is a client computer that accesses the filer using `telnet`. When describing commands entered on the administration host, this guide assumes that the host runs the SunOS operating system. The administration host, however, is not required to run SunOS.

In examples of UNIX commands, this guide shows the command syntax used in SunOS 4.1.x. The command syntax and output may be different depending on the version of UNIX that you are using.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. (The keys on your keyboard may not be labeled exactly as they are in this guide.)

When describing key combinations, this guide uses the hyphen (-) to separate individual keys. For example, Ctrl-D means pressing the Control and D keys simultaneously. Also, this guide uses the term Enter to refer to the key that generates a carriage return, although the key is named Return on some keyboards.

This guide uses the term “type” to mean pressing one or more keys on the keyboard. It uses the term “enter” to mean pressing one or more keys and then Enter.

Formatting conventions

This table describes typographical conventions used in the guide:

Formatting convention	Type of information
<i>Italic type</i>	Words or characters that require special attention. File names. Placeholders for information you must supply. For example, if the guide says to enter the <code>arp -d <i>hostname</i></code> command, you enter the characters “arp -d” followed by the actual name of the host. Man page names. Book titles in cross-references.
Monospaced font	Command and daemon names. Information displayed on the system console or other computer monitors. The contents of files.
Bold monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless it must be typed in uppercase letters to work properly.

Special messages

This guide contains special paragraphs denoted by icons in the margin. They are described as follows:



NOTE: A note contains important information that helps you install or operate the system efficiently.



CAUTION: A caution contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.



WARNING: A warning contains instructions that you must follow to avoid personal injury.

Chapter 1: Introduction

This chapter provides an overview of the units that are field replaceable in the NetApp F500 series filers.

This chapter includes the following information:

- list of the units that can be replaced
- list of the tools and equipment required for servicing the filer
- information about shutting down the filer and disk shelves



CAUTION: Do not operate the filer for an extended time with the front door or the system board carrier open. The front door and system board carrier should remain closed to ensure the proper cooling of the system.

Replaceable units

This section identifies and describes the replaceable units in the filer. NetApp F500 series filers are designed for easy access so units can be removed and installed in the field. The units are accessible from the front or back panel. You must purchase field replaceable units from Network Appliance — except for the DRAM SIMMs, SCSI disk drives, and NVRAM card batteries.



NOTE: The NetApp F500 series filers share the same chassis and units with the exception of the front bezel. Also, different models in the series support different types and numbers of expansion cards.

The following units are field replaceable:

- system board (with removable DRAM SIMMs and CPU fan)
- expansion cards
 - SCSI cards for disk drives and tape devices
 - network cards
 - environmental card
 - NVRAM card (with removable SIMMs and lithium batteries)
- internal storage devices
 - 3.5-in diskette drive
 - DLT tape drive (in the NetApp F540)
- filer power supply
- fans
 - filer fan assembly
 - CPU fan
- LCD control panel

Units accessible from the front

The NetApp F540 front panel consists of an aluminum bezel and sliding door (see Figure 1-1). You can remove the bezel to get access to the fan assembly and LCD control panel (see Figure 1-2). To remove the bezel, hold the upper and lower edges of the bezel and pull it straight off the front panel. To replace the bezel, align the pins on the bezel with the holes on the front panel, then push the bezel straight on the panel.

The front door can be opened to get access to the diskette and tape drive (see Figure 1-3). To open the door, grip the right edge of the door and slide it to the left.

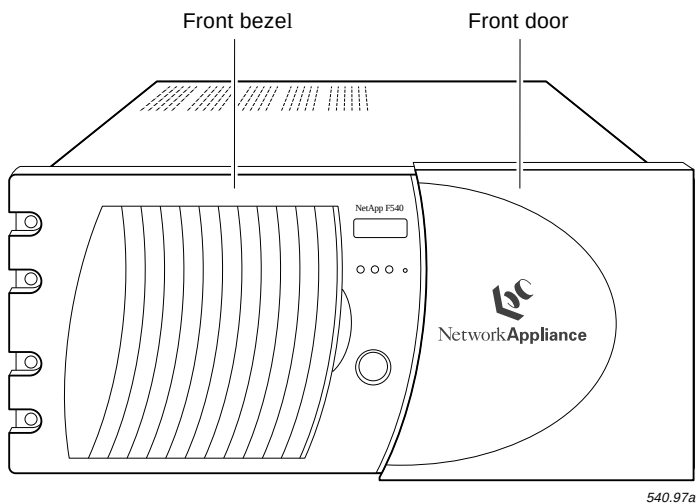


Figure 1-1. NetApp F540 front bezel and door

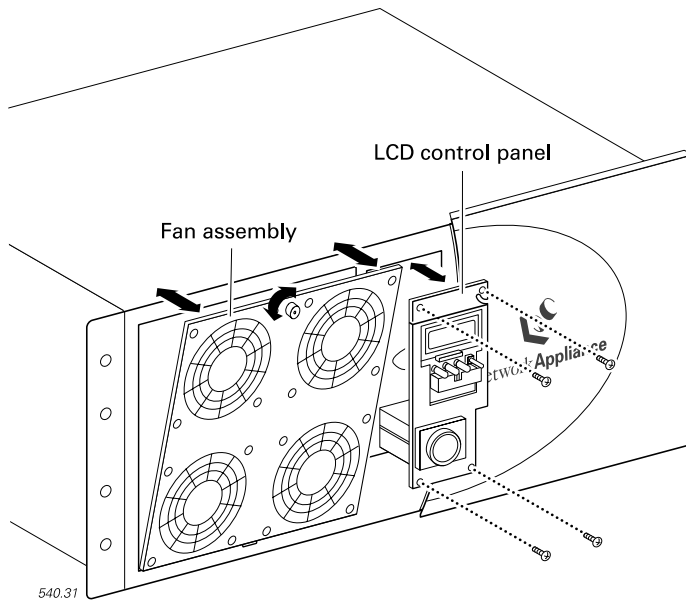


Figure 1-2. NetApp F540 units accessible from the bezel side

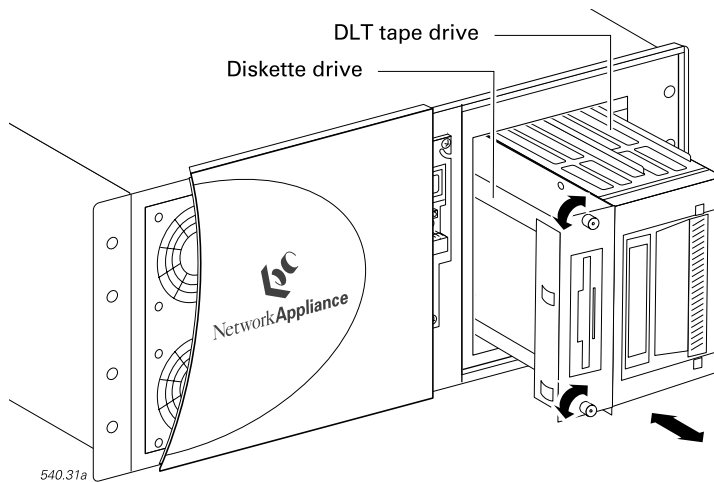


Figure 1-3. NetApp F540 units accessible from the door side

The NetApp F520 front panel consists of a plastic bezel and snap-on door (see Figure 1-4). You can remove the bezel and front door to get access to the fan assembly, LCD control panel, and diskette drive (see Figure 1-5).

To remove the bezel, hold the upper and lower edges of the bezel and pull it straight off the front panel. To replace the bezel, align the pins on the bezel with the holes on the front panel, then push the bezel straight on the panel. To remove the door, press in on the tab located on the edge of the door that is closest to the front panel AC power switch and lift the door out of the bezel.

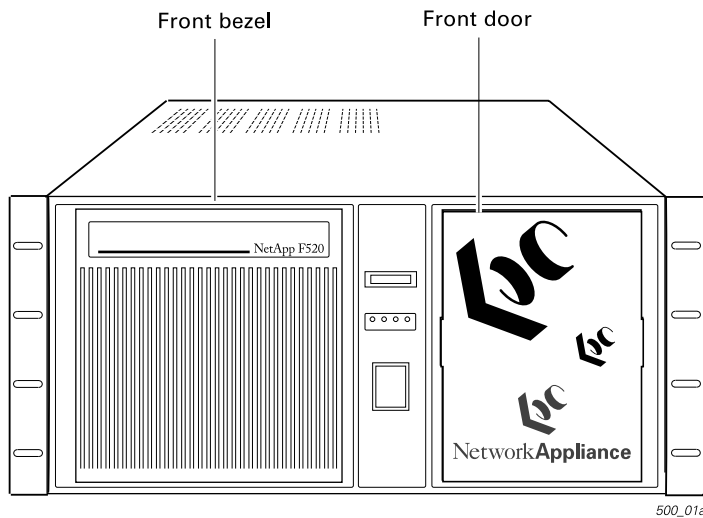


Figure 1-4. NetApp F520 front bezel and door

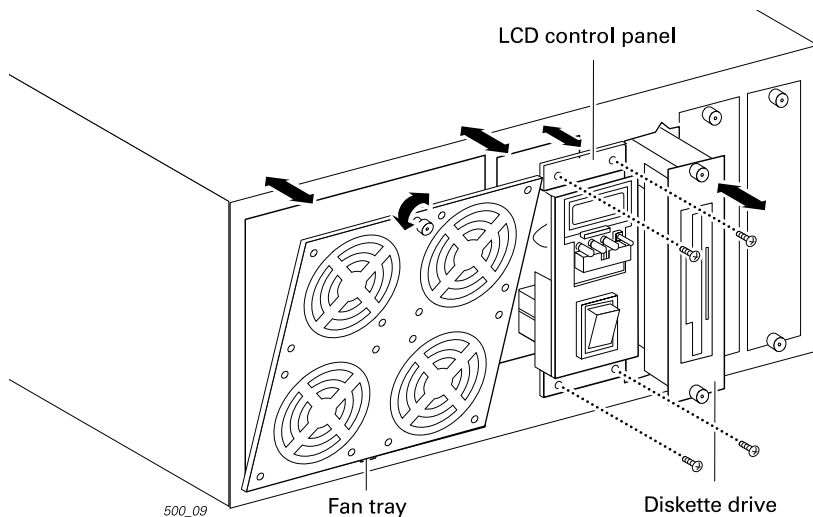


Figure 1-5. NetApp F520 units accessible from the front panel

Table 1-1 describes the replaceable units that are accessible from the front of the filer.

Table 1-1. Units accessible from the front

Replaceable unit	Location	Fastener
Fan assembly	Mounted in the fan assembly bay at the left of the front panel.	Secured to the front panel by one thumbscrew.
LCD control panel	Mounted in the LCD control panel bay at the center of the front panel.	Secured to the front panel by four panhead screws.

Table 1-1. Units accessible from the front (continued)

Replaceable unit	Location	Fastener
Diskette drive	Mounted on a carrier that slides out of the leftmost drive bay.	Secured to the front panel by two external thumbscrews, and secured inside its drive carrier by four internal carrier screws.
DLT tape drive	The DLT tape drive is an optional unit in the NetApp F540. If installed, it is mounted on a carrier that slides out of both the middle and rightmost drive bays.	If installed, the tape drive is attached to the diskette drive by four screws shared between the two drives, and secured inside its drive carrier by four internal carrier screws. Secured to the front panel by two external thumbscrews located on the diskette drive side.

Units accessible from the back

The filer power supply, system board, and expansion cards are accessible from the back of the filer. A system board carrier is a slide-mounted tray that serves as the mounting base for the system board and expansion cards. The system board carrier can be pulled out of the cabinet for access to the system board components and expansion cards. Refer to the *Hardware Guide for the NetApp F500 Series* for information about opening and removing the system board carrier.

Figure 1-6 shows the units accessible from the back panel. Table 1-2 describes the replaceable units that are accessible from the back of the filer.

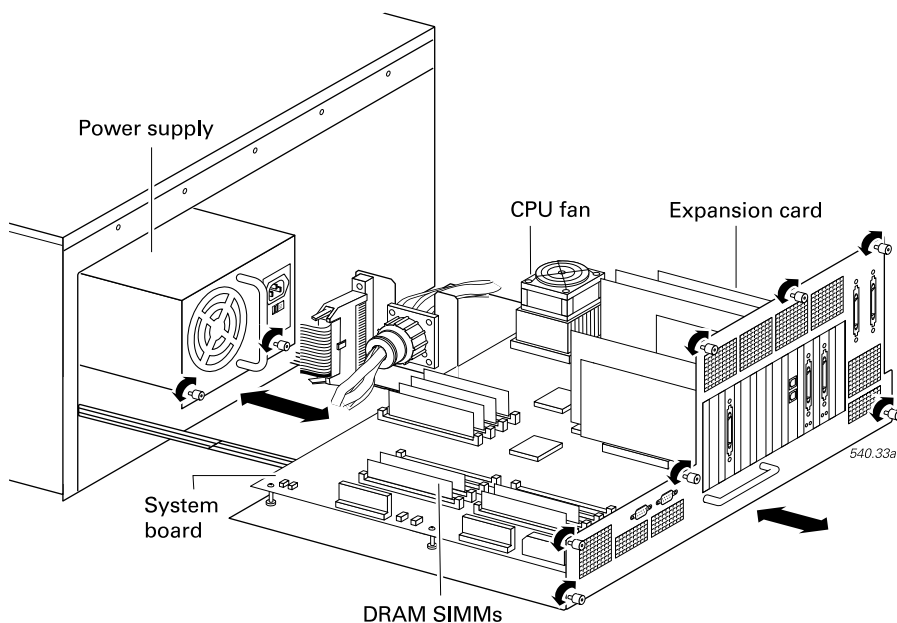


Figure 1-6. Units accessible from the back of the filer

Table 1-2. Units accessible from the back

Replaceable unit	Location	Fastener
System board	Inserted over three stand-off pins on the system board carrier.	Secured to the system board carrier by six 6-32 $\times$ 3/8 screws.
CPU fan	Mounted on the heat sink that is located above the CPU.	Secured to the heat sink by four screws.
DRAM SIMMs	Seated individually in each DRAM SIMM slot on the system board.	Secured to each SIMM slot by a pair of SIMM mounting tabs.
Expansion cards	Seated individually in each expansion slot on the system board.	Secured to the back panel by one screw for each card.
Power supply	Seated in the power supply bay.	Secured to the back panel by two thumbscrews.

Tools and equipment

You need the following tools and equipment to replace units in the filer:

- flat-tip screwdriver (3/16-in)
- Phillips screwdrivers (#1 and #2)
- nut driver (3/16-in)
- small needle-nose pliers
- scissors or wire cutters with insulated handles
- antistatic wrist strap and grounding leash
- voltmeter
- *Hardware Guide for the NetApp F500 Series* and disk shelf documentation



CAUTION: The filer uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Wear an antistatic wrist strap and grounding leash to free yourself of static electricity before touching any electronic components.

If you are adding expansion cards to the system, check for information about expansion slot assignments at the “NetApp on the Web” (NOW) web page at <http://now.netapp.com>.

Shutting down the filer and disk shelves

To maintain data integrity and provide safety measures against personal injury, most procedures in this guide require that you shut down (halt) and power down the filer and disk shelves before you remove or install units. Refer to the *Hardware Guide for the NetApp F500 Series* for information about how to power down the filer. Refer to the documentation that shipped with your disk shelf for information about how to power down the disk shelf.

Chapter 2: System board

This chapter provides the procedures for removing and installing the system board, and provides the procedures for replacing or upgrading the system memory (DRAM SIMMs) on the system board.



CAUTION: The filer uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Wear an antistatic wrist strap and grounding leash to free yourself of static electricity before touching any electronic components.

System board components

Figure 2-1 shows the layout of the main components on the system board. Table 2-1 describes the main components.

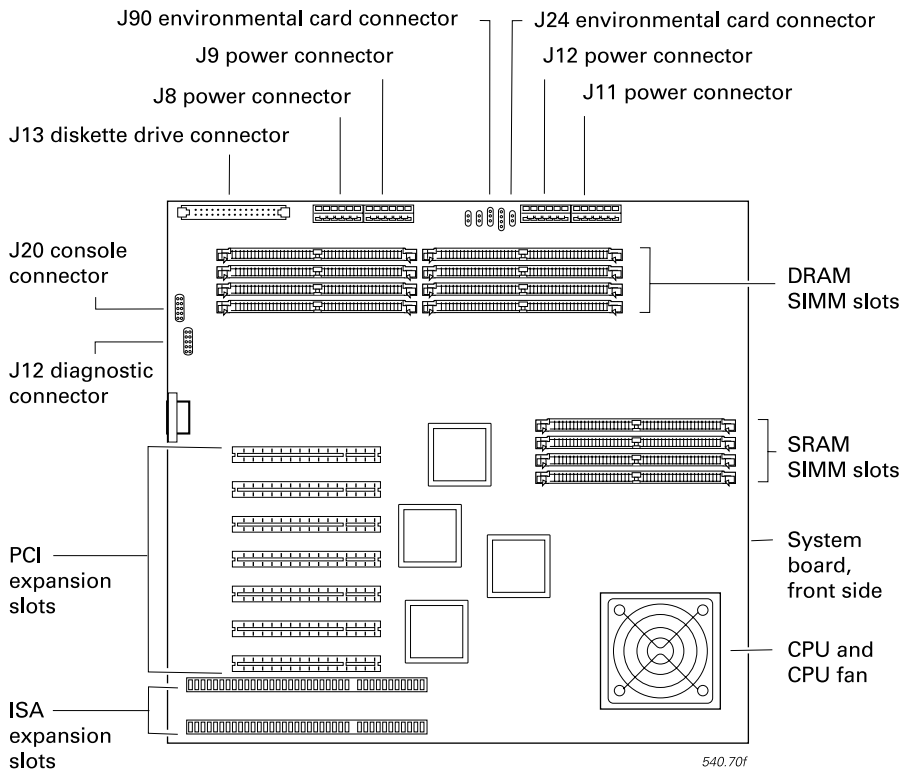


Figure 2-1. System board main components

Table 2-1. System board main components

Major unit	Description
DRAM SIMMs	The system board uses 72-pin, 16-MB or 32-MB DRAM SIMMs. These SIMMs are installed into eight SIMM slots for memory configurations expandable from 64 MB up to 256 MB.
SRAM SIMMs	The system board uses 72-pin, 512-KB SRAM SIMMs. These SIMMs are installed into four SIMM slots for an L2 cache configuration of 2 MB. The L2 cache is not expandable and is not a field replaceable unit.
CPU fan	A CPU fan is mounted on the heat sink. This fan must be operating any time the filer is powered. Refer to Chapter 5, “Power supply and fans,” for replacement instructions.
CPU	The CPU is not a field replaceable unit.
Connectors and slots	• One ISA expansion slot (slot 9); there are two ISA slots but only the outermost slot is used. • Seven PCI expansion slots (slot 2, 3, 4, 5, 6, 7, and 8). • Two full-duplex RS-232 serial connectors (J20 console and J12 diagnostic) accessed through two ports on the system board carrier back panel. • A diskette drive controller connector (J13). • Four system power connectors (P8, P9, P11, and P12). • Two environmental card connectors (J24 and J90).

Replacing the system board

This section describes the procedures for removing and installing the system board.



CAUTION: Remove the CPU fan from the system board before you ship the board to Network Appliance. If the fan is not removed, it might loosen during transit and damage the system board. Refer to “Removing the CPU fan” on page 5-12 for the procedure on how to remove the CPU fan.

Removing the system board

To remove the system board, follow these step:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.
4. Remove the DRAM SIMMs.

Refer to “Removing the DRAM SIMMs” on page 2-24 for instructions.

5. Remove all expansion cards.

Refer to Chapter 3, “Expansion cards,” for instructions.

6. Disconnect the P11, P12, P9, and P8 power cables from the J11, J12, J9, and J8 connectors as follows (see Figure 2-2):
 - a. Wiggle the cable gently while pulling the cable straight up partially.
 - b. Pull out the cable at a 45° angle towards the CPU fan.

The other ends of these cables are connected to the J1 cable harness connector.

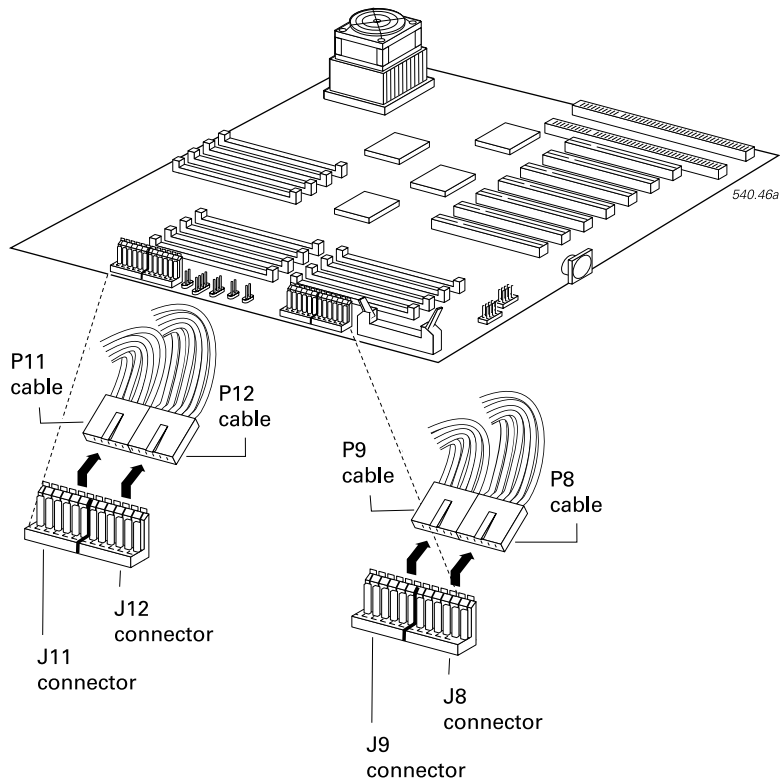


Figure 2-2. Disconnecting the P11, P12, P9, and P8 power cables

7. Disconnect the P24 and P90 environmental card cables from the J24 and J90 connectors (see Figure 2-3).

The other ends of these cables are connected to the environmental card.

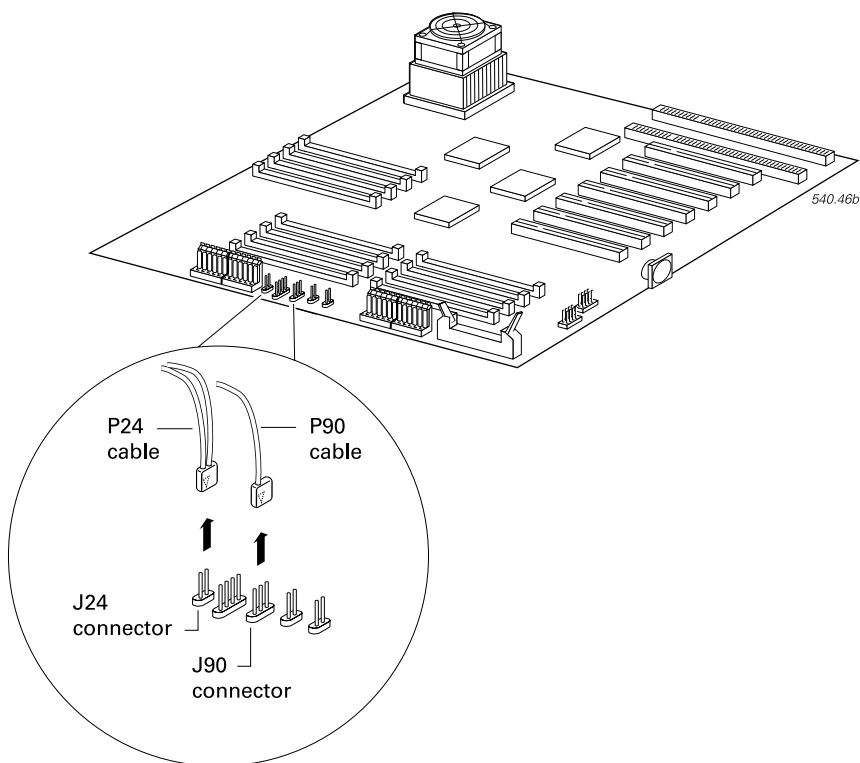


Figure 2-3. Disconnecting the P24 and P90 environmental card cables

8. Disconnect the P13 diskette drive cable from the J13 connector as follows (see Figure 2-4):
 - a. Press outward on the wing tabs on the connector.
 - b. Pull out the cable.

The other end of this cable is the J7 connector.

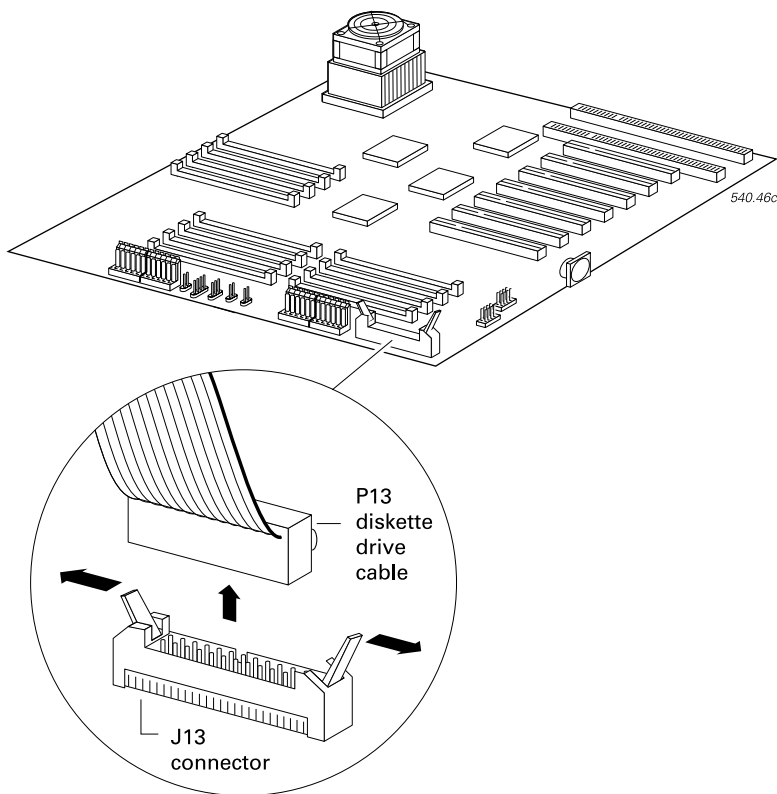


Figure 2-4. Disconnecting the P13 diskette drive cable

9. Disconnect the P20 and P12 serial cables from the J20 and J12 connectors (see Figure 2-5).

The other ends of these cables are connected to the serial ports on the back panel of the system board carrier.

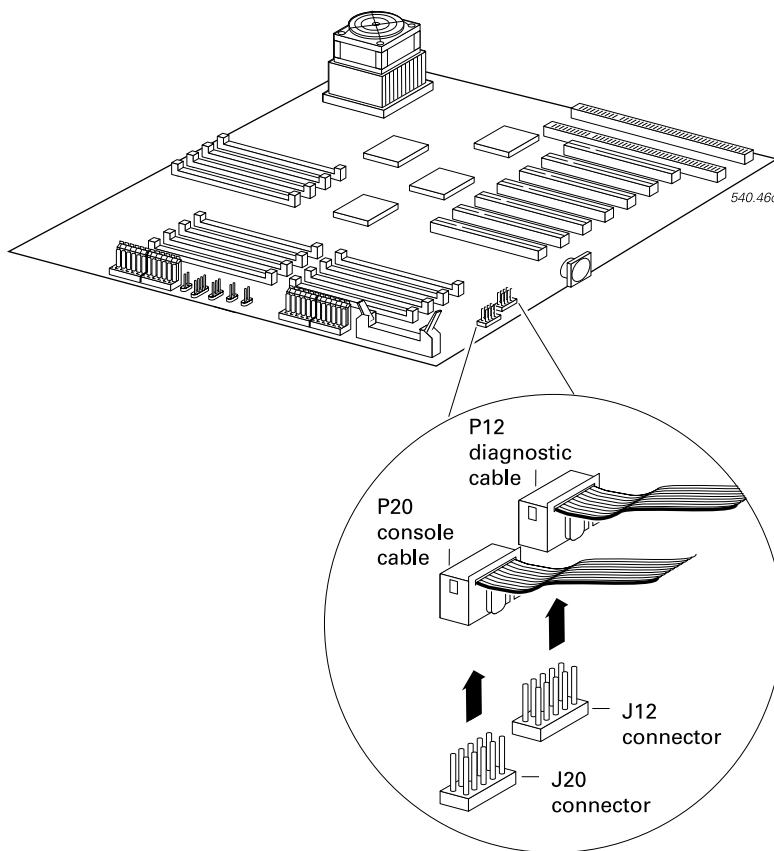


Figure 2-5. Disconnecting the P20 and P12 serial cables

10. Locate the P1 cable harness and the P6 diskette drive cable (see Figure 2-6).

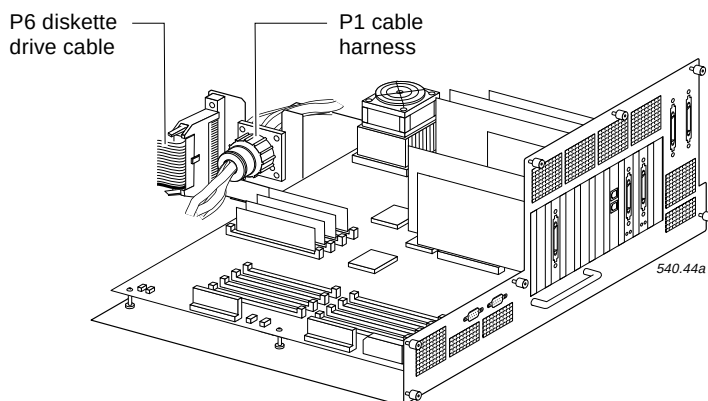


Figure 2-6. Locating P1 cable harness and P6 diskette drive cable

11. Disconnect the P1 cable harness from the J1 connector by turning the ring on the P1 cable harness counter-clockwise until the cable disengages (see Figure 2-7).

The other end of this cable is branched and connected to the system board and environmental card.

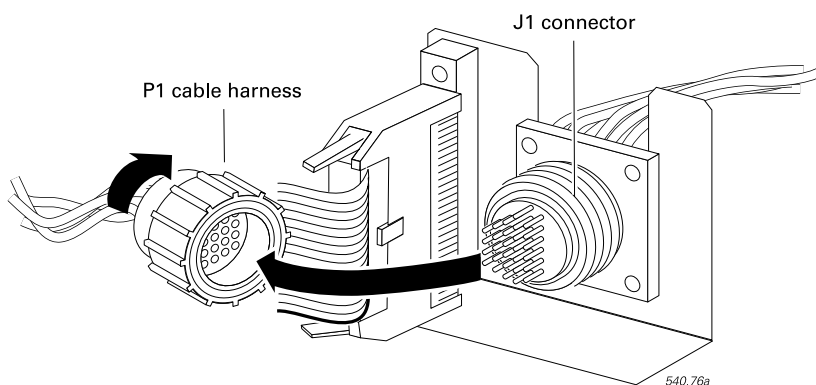


Figure 2-7. Disconnecting P1 cable harness

12. Disconnect the P6 diskette drive cable from the J7 connector by pressing outward on the wing tabs and pulling out the cable (see Figure 2-8).

The other end of this cable is connected to the diskette drive.

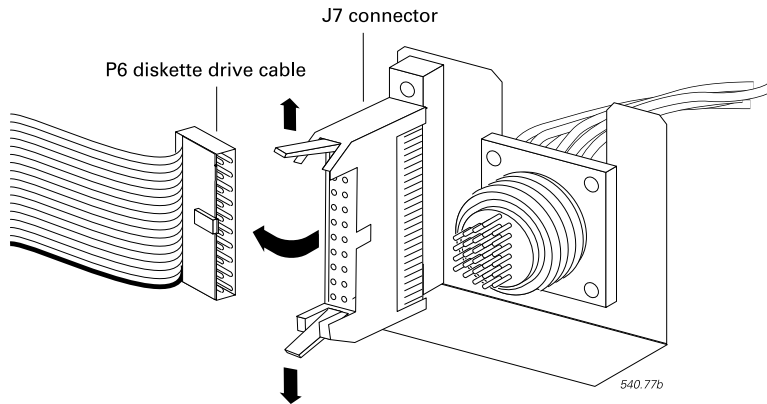


Figure 2-8. Disconnecting the P6 diskette drive cable

13. Disconnect the J3 CPU fan cable from the P3 system CPU fan cable (see Figure 2-9).

The other end of the P3 system CPU fan cable is branched from the P2 system fan assembly cable on the environmental card.

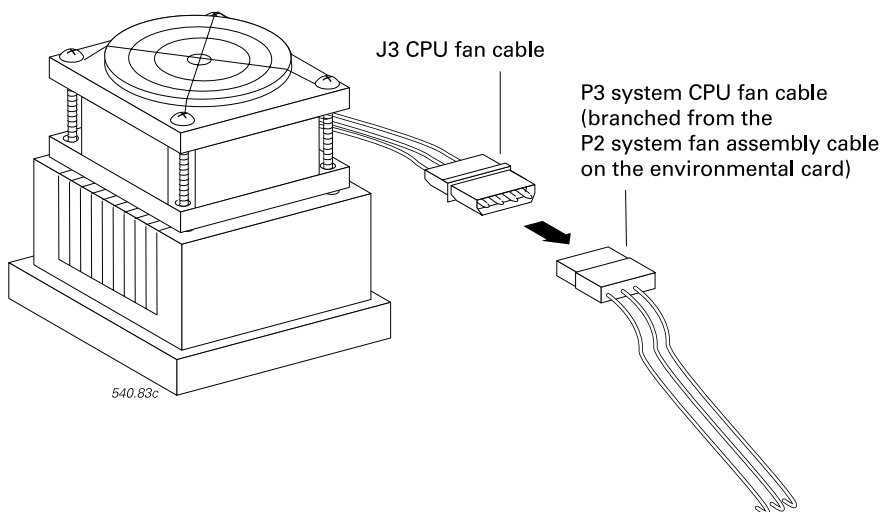


Figure 2-9. Disconnecting the CPU fan cable

14. Remove the system board carrier from the cabinet.

Refer to the *Hardware Guide for the NetApp F500 Series* for information about how to remove the system board carrier.

15. Remove the six screws on the system board (see Figure 2-10).

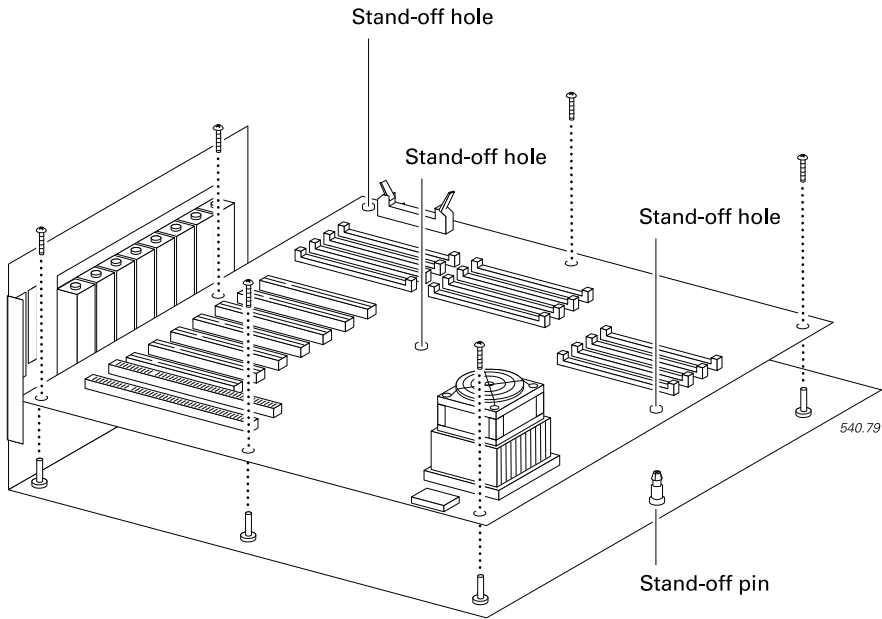


Figure 2-10. Removing the system board mounting screws

16. Pull off the system board from the system board carrier and set the board aside on an antistatic surface.

The system board is held by three press-fit, stand-off pins on the system board carrier.



CAUTION: Be careful when handling the system board because the integrated circuits on the bottom of the system board might be sharp.

Installing the system board

To install the system board, follow these steps:

1. Turn the system board so that the expansion slots are toward the system board carrier back panel.
2. Place the system board onto the system board carrier.
3. Align the three stand-off holes on the system board with the three stand-off pins on the system board carrier.
4. Press down the system board until the stand-off pins snap into place.
5. Replace the six screws to secure the system board (see Figure 2-11).

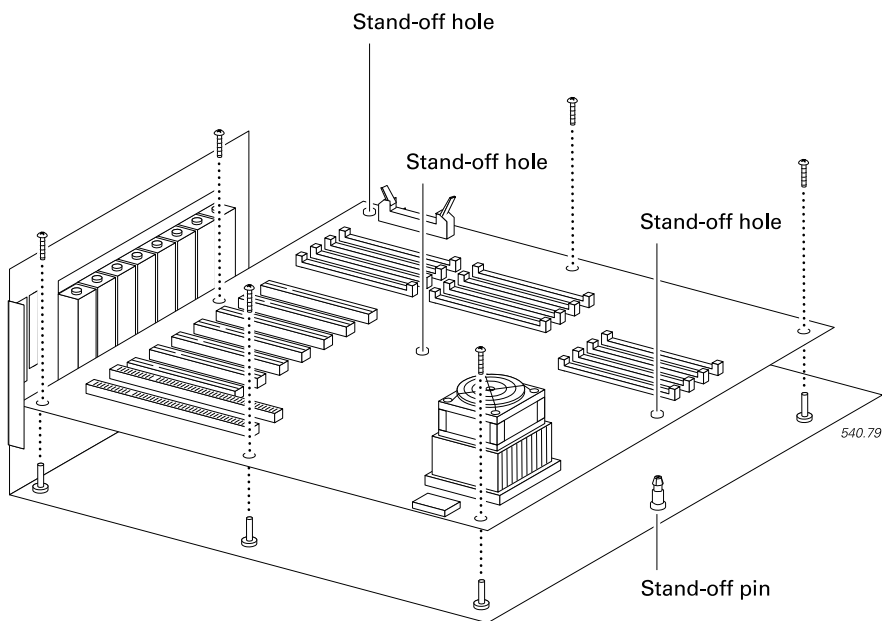


Figure 2-11. Replacing the system board mounting screws

6. Connect the P11, P12, P9, and P8 power cables to the J11, J12, J9, and J8 connectors as follows (see Figure 2-12):
 - a. Insert the cable partially at a 45° angle towards the CPU fan. The cable is keyed so that it can fit in only one way.
 - b. Wiggle the cable gently while pushing the cable straight down.

The other ends of these cables are connected to the J1 cable harness connector.

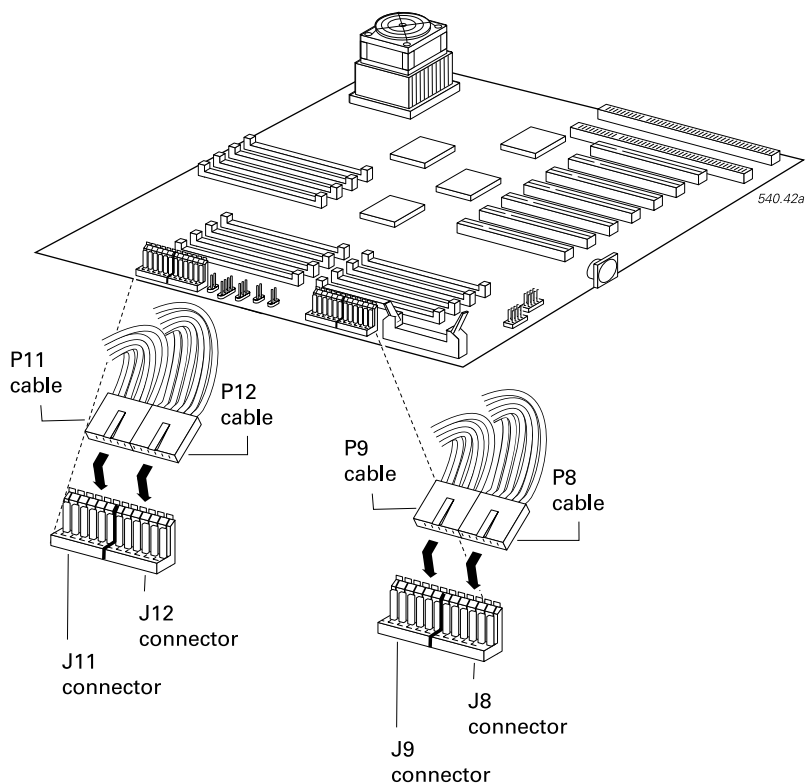


Figure 2-12. Connecting the P11, P12, P9, and P8 power cables

7. Connect the P24 and P90 environmental card cables to the J24 and J90 connectors as follows (see Figure 2-13):
 - a. Align the mark for pin 1 on the cable with pin 1 on the connector.
 - b. Push in the cable.

The other ends of these cables are connected to the environmental card.

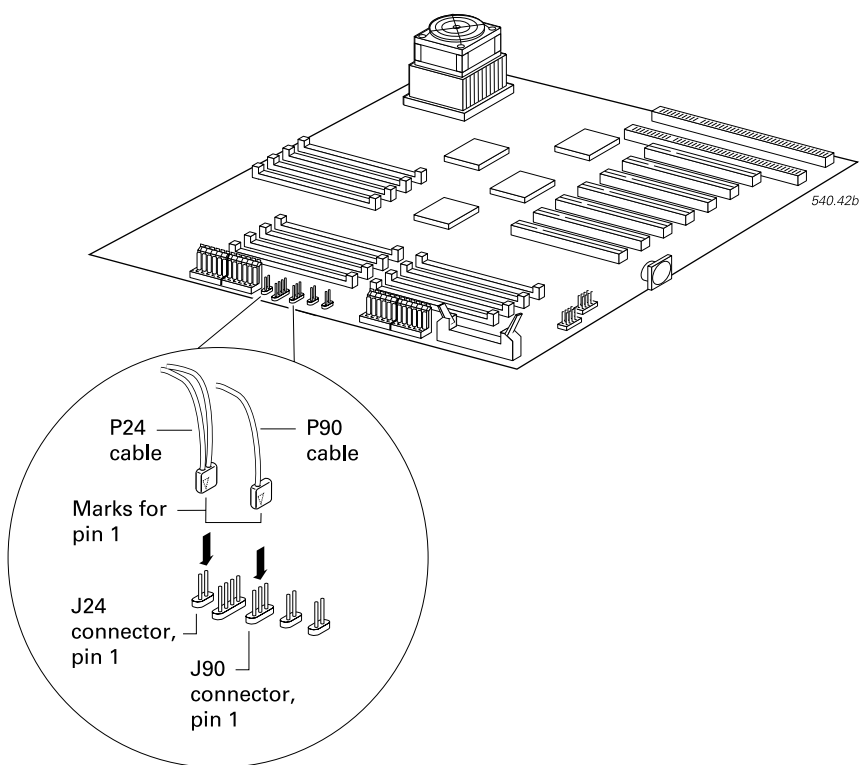


Figure 2-13. Connecting the P24 and P90 environmental card cables

8. Connect the P13 diskette drive cable to the J13 connector as follows (see Figure 2-14):

- a. Align the red stripe on the cable with pin 1 on the connector. The cable is keyed so that it can fit in only one way.
- b. Push in the cable until the wing tabs click in place.

The other end of this cable is the J7 connector.

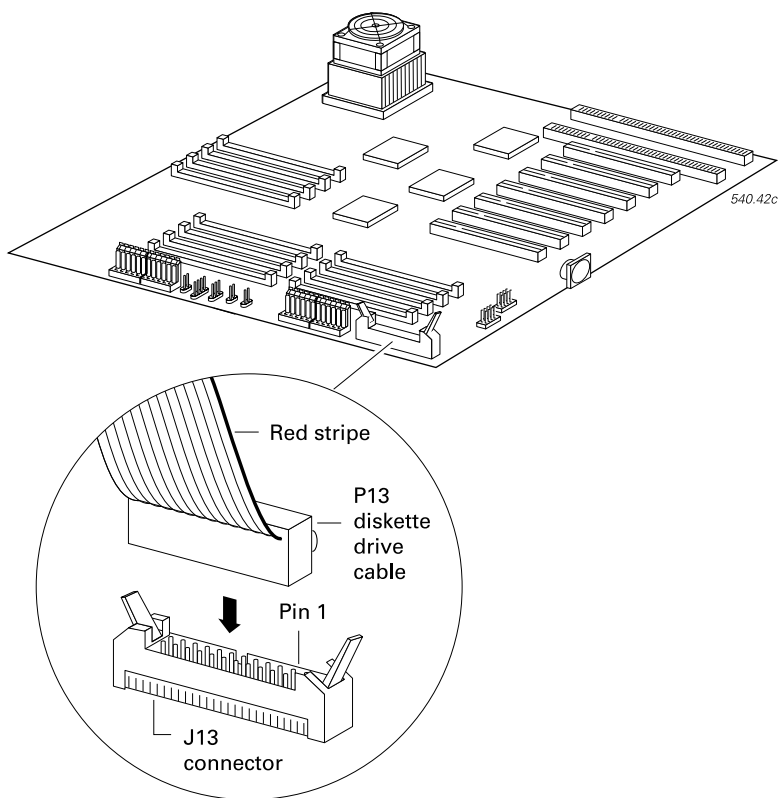


Figure 2-14. Connecting the P13 diskette drive cable

9. Connect the P20 and P12 serial cables to the J20 and J12 connectors as follows (see Figure 2-15):
 - a. Align the red stripe on the cable with pin 1 on the connector.
 - b. Push in the cable.

The other ends of these cables are connected to the serial ports on the system board carrier back panel.

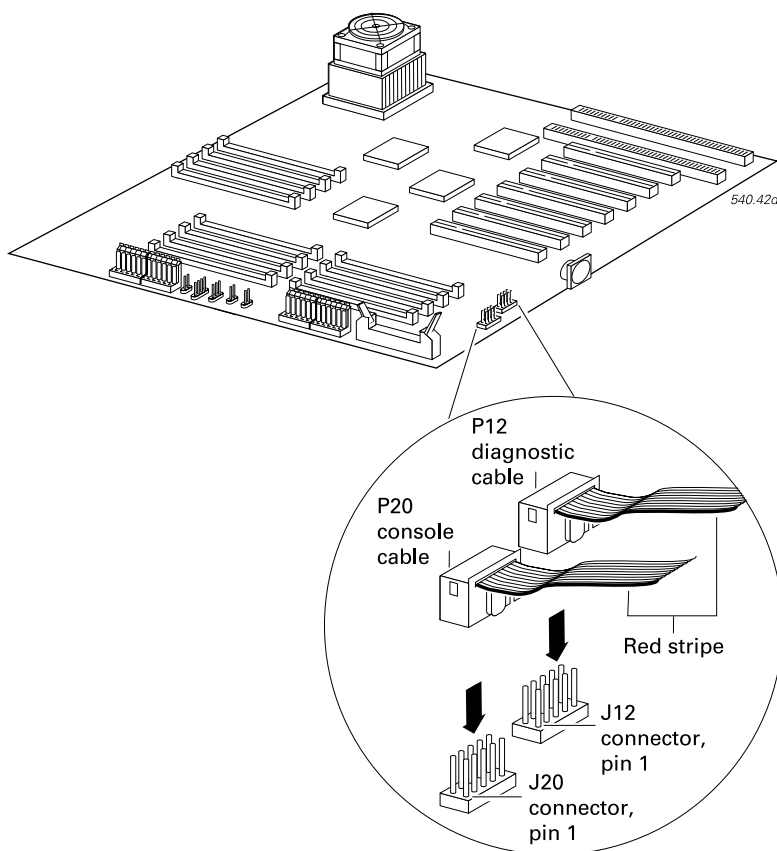


Figure 2-15. Connecting the P20 and P12 serial cables

10. Locate the J1 and J7 connectors (see Figure 2-16).

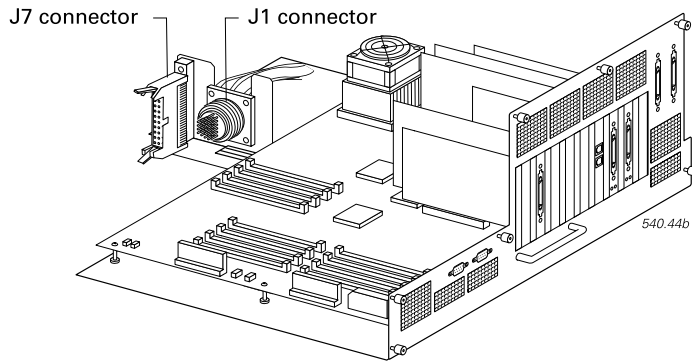


Figure 2-16. Locating the J1 and J7 connectors

11. Connect the P1 cable harness to the J1 connector as follows (see Figure 2-17):
- Align the holes on the P1 cable harness with the pins on the J1 connector. The cable is keyed so that it can fit in only one way.
 - Turn the ring on the P1 cable harness clockwise until it clicks in place.

The other end of this cable is connected to the power supply.

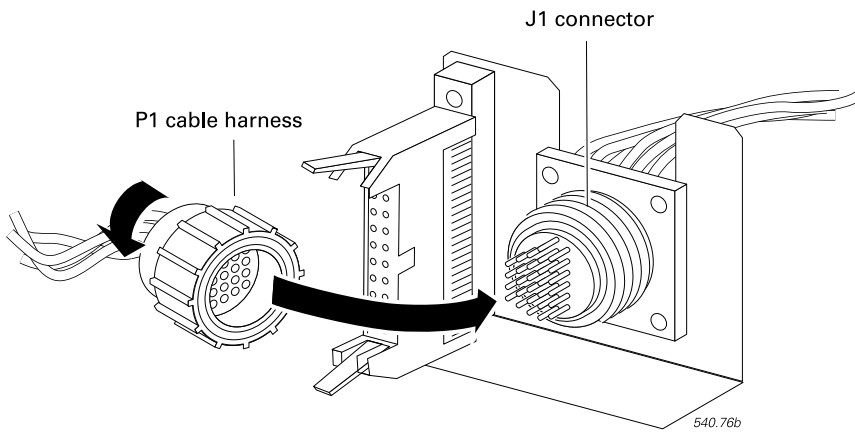


Figure 2-17. Connecting the P1 cable harness

12. Connect the P6 diskette drive cable to the J7 connector as follows (see Figure 2-18):

- a. Align the red stripe on the cable to pin 1 on the connector. The cable is keyed so that it can fit in only one way.
- b. Push in the cable until the wing tabs click in place.

The other end of this cable is connected to the diskette drive.

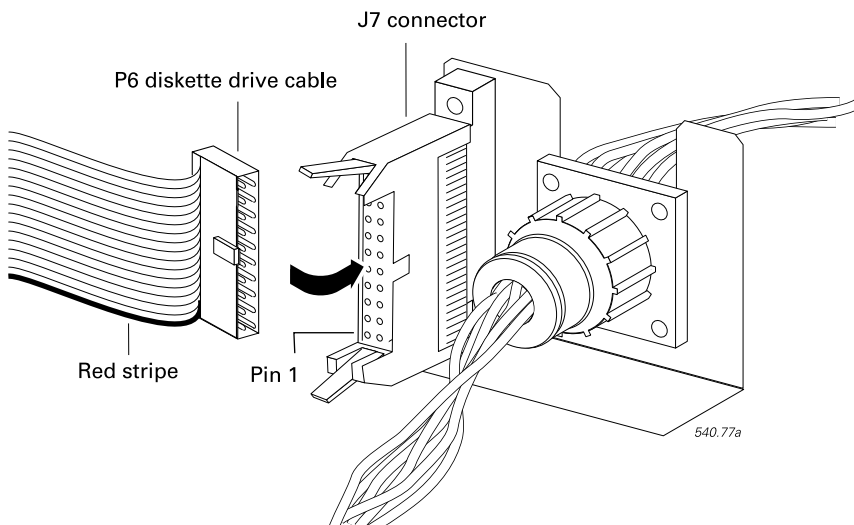


Figure 2-18. Connecting the P6 diskette drive cable

13. Connect the J3 CPU fan cable to the P3 system CPU fan cable (see Figure 2-19).

The P3 system CPU fan cable is branched from the P2 fan assembly cable on the environmental card. The cable is keyed so that it can fit in only one way.

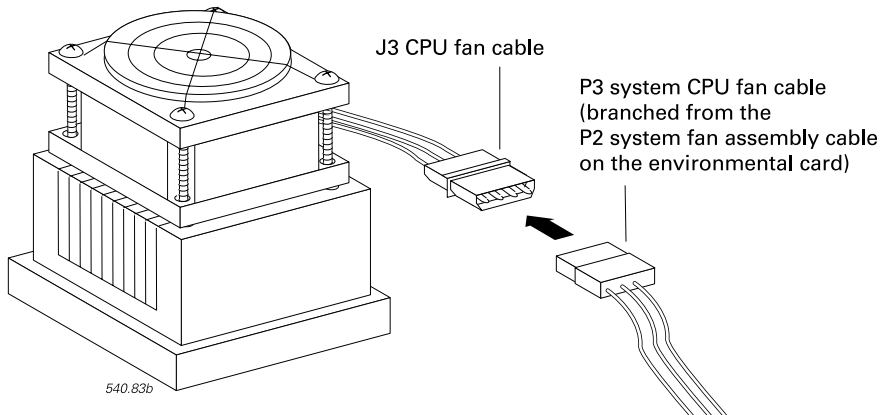


Figure 2-19. Connecting the CPU fan cable

14. Make sure all cables described in this section are securely attached to their connectors.

15. Reinstall the DRAM SIMMs.

Refer to “Installing the DRAM SIMMs” on page 2-25 for instructions.

16. Reinstall all expansion cards.

Refer to Chapter 3, “Expansion cards,” for instructions.

17. Push in the system board carrier and tighten the seven thumbscrews on the back panel.

18. Turn on the filer and disk shelves.

Adding or replacing system memory

This section provides the procedures for adding or replacing the DRAM SIMMs on the system board.

Figure 2-20 shows the location of the DRAM SIMM slots.

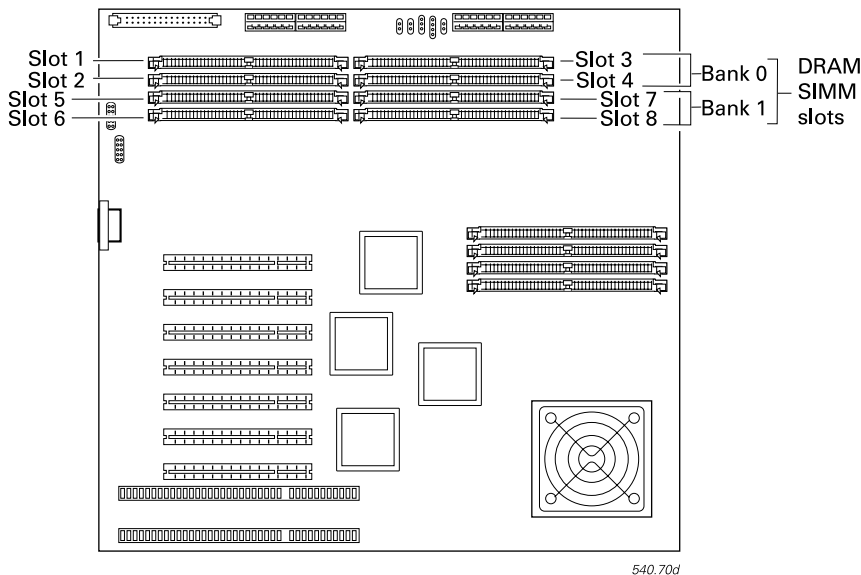


Figure 2-20. System board DRAM SIMM slots

The DRAM SIMMs must meet the following requirements:

- 72-pin tin-lead, fast page-mode DRAM SIMMs, with an RAS access time of 60 nanoseconds or faster. These SIMMs are 40-bit wide (32 data bits and 8 bits for error correction).
- All SIMMs must be listed on the Network Appliance Approved Parts List. Obtain this list by contacting Network Appliance Sales. Do not use unapproved SIMMs.
- All SIMMs must be the same size within the same bank (that is, 16-MB or 32-MB SIMMs).

- Install the SIMMs in sets of four to fill up one bank.
- Install the SIMMs into the slots with the lowest available slot number first.

Configuring the system memory

The possible configurations for the system memory are 64 MB, 128 MB, 192 MB, and 256 MB. You must add the DRAM SIMMs one bank at a time, starting with bank 0. The possible DRAM SIMM configurations are listed in Table 2-2.

Table 2-2. DRAM SIMM configurations

Memory	Bank 0 (slots 1, 2, 3, and 4)	Bank 1 (slots 5, 6, 7, and 8)
64 MB	four 16-MB SIMMs	none
128 MB	four 16-MB SIMMs	four 16-MB SIMMs
128 MB	four 32-MB SIMMs	none
192 MB	four 16-MB SIMMs	four 32-MB SIMMs
256 MB	four 32-MB SIMMs	four 32-MB SIMMs

Removing the DRAM SIMMs

To remove the DRAM SIMMs, follow these steps:

1. Turn off the filer and disk shelves.
2. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.
3. Locate the DRAM SIMMs that you are removing (see Figure 2-20 on page 2-22).
4. Press outward on the SIMM mounting tabs to release the SIMM (see Figure 2-21), starting with the highest occupied slot number first.

The SIMM automatically lowers at a 45° angle when released.

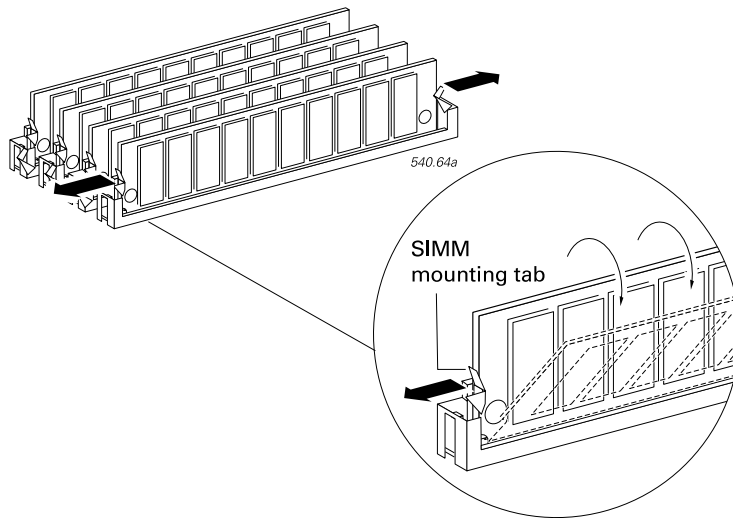


Figure 2-21. Releasing the SIMM

5. Lift out the SIMM at a 45° angle and set the SIMM aside in an antistatic bag.

Installing the DRAM SIMMs

To install the DRAM SIMMs, follow these steps:

1. Locate the SIMM slots into which you are installing the new SIMMs (see Figure 2-20 on page 2-22).
2. Turn the SIMM so that its locator notch is towards the back of the system board (see Figure 2-22).

Hold the SIMM by its top corners to avoid damaging the components.

3. Align the SIMM over the slot while tilting the top edge of the SIMM at a 45° angle towards the CPU fan (see Figure 2-22).

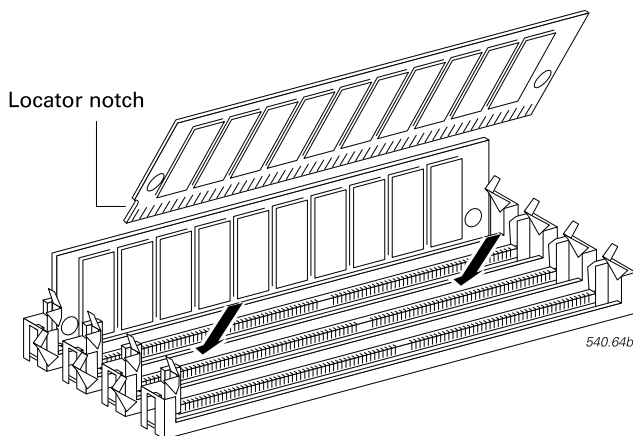


Figure 2-22. Aligning the SIMM with its slot

4. Insert the SIMM at a 45° angle into the slot, starting with the lowest available slot number first.

The SIMM should go into the slot easily. If not, realign the SIMM with the slot and try again.



CAUTION: Visually inspect that the SIMM is evenly aligned and fully inserted into the slot; otherwise, the SIMM could bend or break when pushed to the locked position.

5. Push the SIMM until the mounting tabs close over the SIMM to lock it in place (see Figure 2-23).

The SIMM should be perpendicular to the system board. If you have problems pushing the SIMM to an upright position, reinsert the SIMM because the SIMM bus connector might not be aligned correctly with the slot.

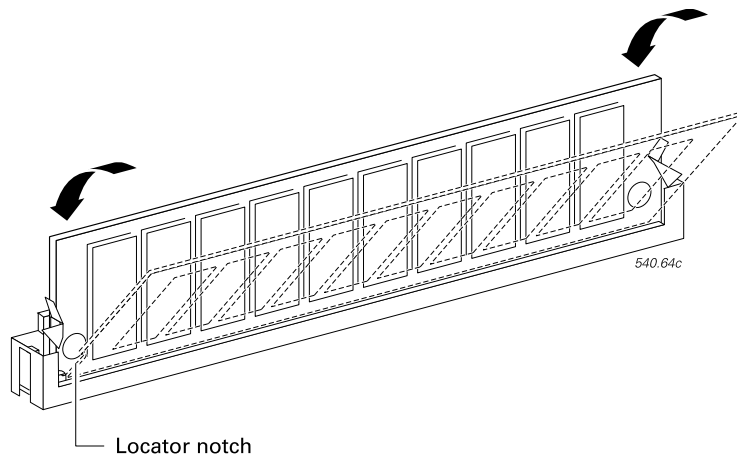


Figure 2-23. Locking the SIMM into place

6. Push in the system board carrier and tighten the seven thumbscrews on the back panel.
7. Turn on the filer and disk shelves.
8. Use the `sysconfig -v` command to verify that the added system memory has been detected.

The system displays configuration information for the filer. The memory configuration information is included in the `System Board` section of the configuration information screen, as shown in the following example:

```
slot 0: System Board 275 MHz (NetApp System Board III)
        Memory Size: 192 MB
```


Chapter 3: Expansion cards

This chapter describes the procedures for installing and replacing the expansion cards. This chapter includes the following information:

- description of expansion slots
- description of expansion cards
- procedures for preparing expansion cards
- procedures for installing and replacing expansion cards



NOTE: To ensure compatibility, performance, and reliability you must obtain filer expansion cards from Network Appliance or an authorized reseller.



CAUTION: The filer uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Wear an antistatic wrist strap and grounding leash to free yourself of static electricity before touching any electronic components.

Expansion slots

The system board has seven PCI expansion slots and one ISA expansion slot. Figure 3-1 shows the location of the expansion slots.



NOTE: If you are adding expansion cards to the system, check for information about expansion slot assignments at the “NetApp on the Web” (NOW) web page at <http://now.netapp.com>.

Slot 8 is designated as two slots:

- slot 8a, a PCI slot which can be used for a fast wide SCSI card
- slot 8b, an ISA slot which is not used

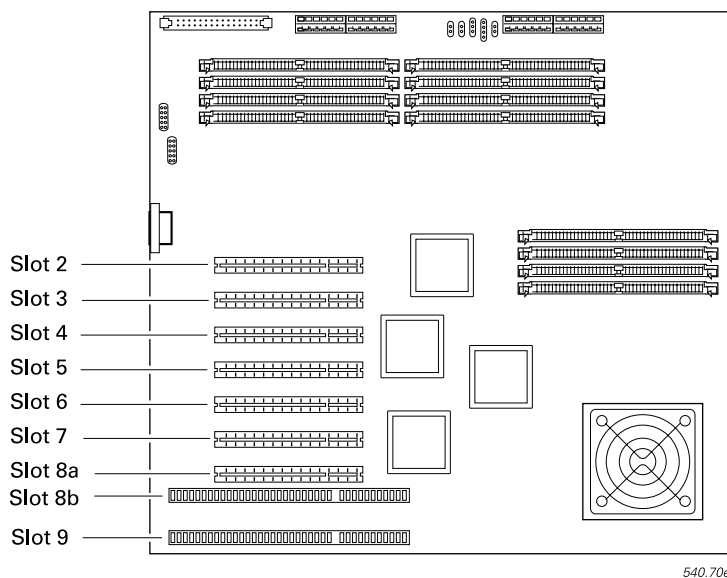


Figure 3-1. Expansion slots on the system board

Expansion cards

The following expansion cards are used in the NetApp F500 series filers:

- SCSI cards
- network cards
- environmental card
- NVRAM card

SCSI cards

The following SCSI cards are used in the NetApp F540:

- dual-channel, differential, fast wide SCSI cards for disks
- single-ended, fast narrow SCSI card for an internal tape drive or external tape device

The following SCSI cards are used in the NetApp F520:

- dual-channel, single-ended, fast wide SCSI cards for disks
- single-ended, fast narrow or differential, wide SCSI card for an external tape device

Network cards

The NetApp F500 series filers support the following network cards:

- Ethernet network cards (single-port and quad-port)
- FDDI network cards (single-attachment and dual-attachment)
- ATM network cards

Environmental card

The filer is equipped with an environmental card that monitors the operating environment of the system. This card is installed in the ISA (Industry Standard Architecture) slot on the system board.

NVRAM card

The NVRAM card functions as a battery-backed write cache for incoming write data and NFS requests. The NVRAM card comes with 2 MB of NVRAM and can be upgraded to 4 MB or 8 MB by installing additional pairs of 1-MB NVRAM SIMMs.



NOTE: Do not attempt to install NVRAM SIMMs from other NetApp filers on the NVRAM card. Install only those replacement NVRAM SIMMs you receive from Network Appliance.

The cache information is protected against loss by a redundant battery system consisting of two lithium batteries. Each lithium battery provides enough power to maintain the data on eight NVRAM SIMMs for two years. The power control circuitry monitors both batteries and switches back and forth to the stronger of the two batteries.

During normal operation, the filer periodically monitors the power status of the lithium batteries and displays a warning message when the batteries are near the failure threshold.



CAUTION: To protect data integrity during a power failure, replace both lithium batteries when the filer indicates that the batteries are low.

Preparing expansion cards

Some of the expansion cards must be prepared before they are installed in the filer. For example, you may need to verify that jumpers are set correctly, add memory, or replace batteries on a card before installing it in the filer. This section provides the preparation procedures for the following expansion cards:

- Differential, wide SCSI card for external tape device
- NVRAM card

The environmental, network, and other SCSI cards do not require preparation before they are installed in the filer.

Differential, wide SCSI card for external tape device

The differential, wide SCSI card is used in the NetApp F520 to connect the filer to a differential, wide SCSI external tape device. The SCSI card is shipped from the factory with terminators (plug-in resistors) installed in the RM1 through RM8 positions on the printed circuit board (see Figure 3-2).

The terminators ensure that the internal SCSI connector (J2) is terminated so the external SCSI connector (J1) can be used to connect an external tape device to the filer. Before you install the card in a filer, make sure the RM1 through RM8 terminators are installed.

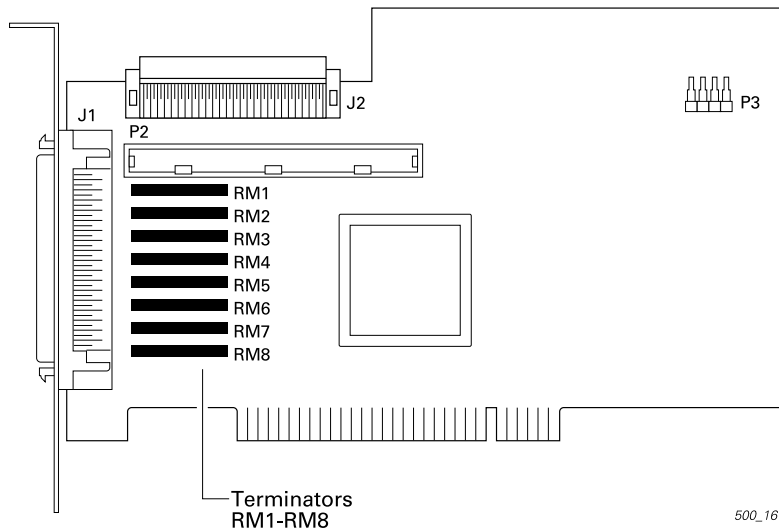


Figure 3-2. Differential, wide SCSI card terminators

NVRAM card

You can upgrade memory or replace the batteries on an NVRAM card before installing the card in the filer. This section provides the following procedures:

- adding or replacing SIMMs
- removing lithium battery insulators
- replacing lithium batteries

Adding or replacing NVRAM SIMMs

The NVRAM card supports 2 MB, 4 MB, and 8 MB of memory. The card comes with two 1-MB NVRAM SIMMs installed in Bank 0 (see Figure 3-3).

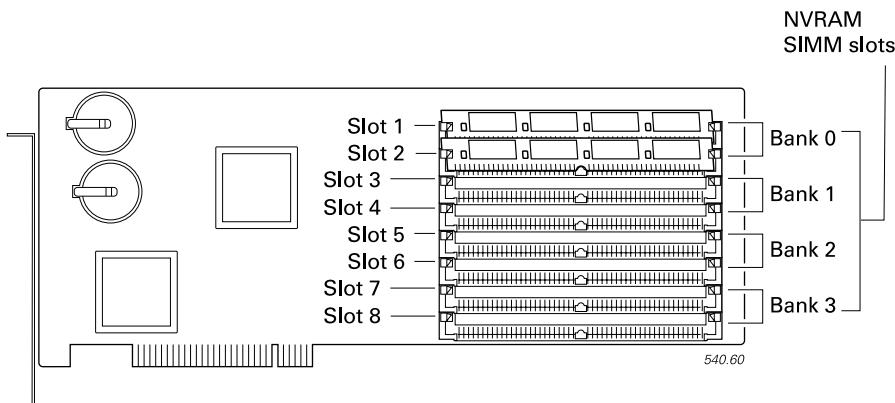


Figure 3-3. NVRAM card SIMM slot locations

You can expand the NVRAM capacity to 4 MB or 8 MB by installing additional pairs of 1-MB NVRAM SIMMs (see Figure 3-4). The SIMMs must be added one bank at a time in the following order: Bank 1, Bank 2, then Bank 3.

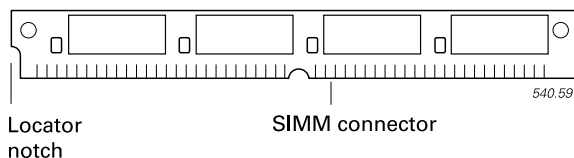


Figure 3-4. NVRAM SIMM for the NVRAM card

To upgrade the NVRAM SIMMs, follow these steps:

1. If you are upgrading SIMMs on an NVRAM card that is already installed in the filer:
 - a. Turn off the filer and disk shelves.
 - b. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.

- c. Remove the NVRAM card from the expansion slot, and set the card aside on an antistatic surface.
2. Press outward on the mounting tabs while lifting out the SIMM, starting with the highest occupied slot number first (see Figure 3-5).

You might find it easier if you press and hold down the mounting tabs with your thumbs while pushing up the SIMM with your index finger.

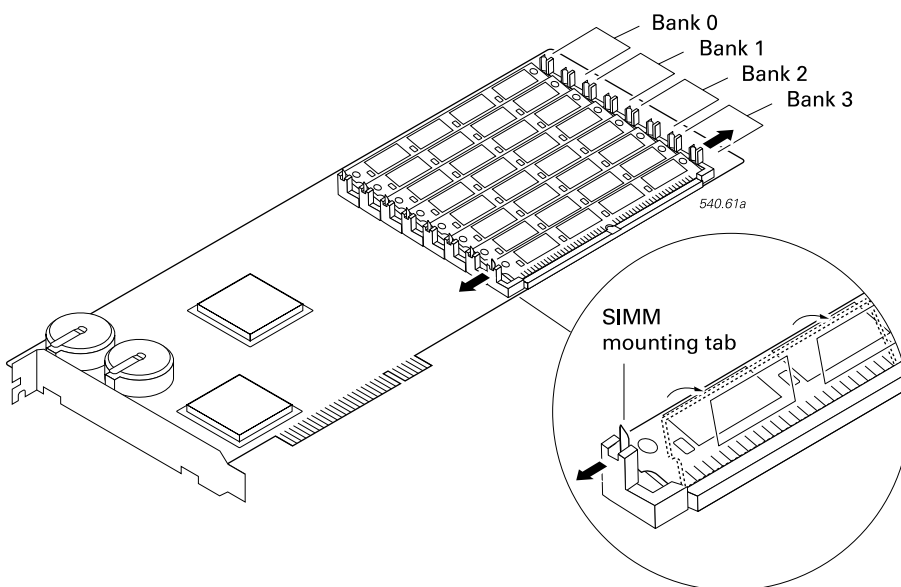


Figure 3-5. Releasing the NVRAM SIMM

3. Set the SIMM aside in an antistatic bag.
4. Turn the new SIMM so that its locator notch is towards the lithium batteries.

Hold the SIMM at the top corners to avoid damaging the components.

5. Align the SIMM over the slot, and tilt the top edge of the SIMM at a slight angle towards the top edge of the NVRAM card (see Figure 3-6).

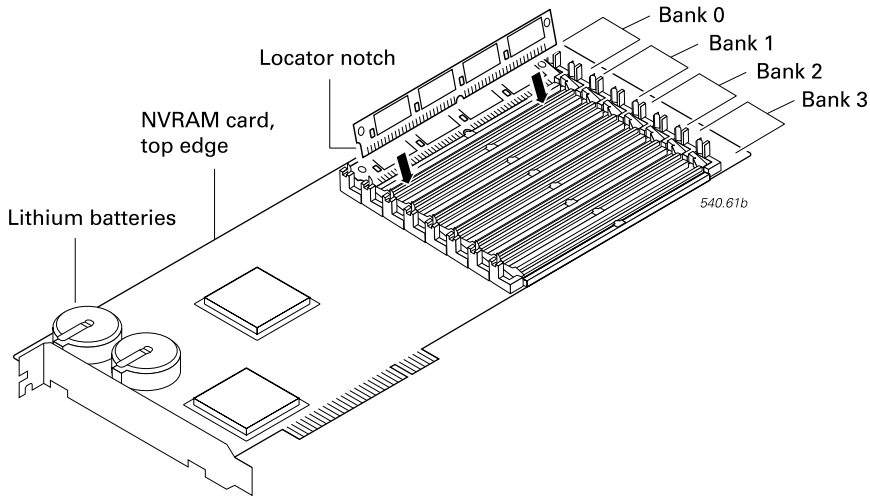


Figure 3-6. Aligning the NVRAM SIMM with its slot

6. Insert the SIMM at an angle into the slot, starting with the lowest available slot number first.

The SIMM should go into the slot easily. If not, realign the SIMM with the slot and try again. The NVRAM SIMM should slide in the slot easily if you gently wiggle the SIMM into position.



CAUTION: Visually inspect that the SIMM is evenly aligned and fully inserted into the slot; otherwise, the SIMM could bend or break when pushed to the locked position.

7. Push downward on the top edge of the SIMM until the mounting tabs close over the SIMM to lock it in place (see Figure 3-7).

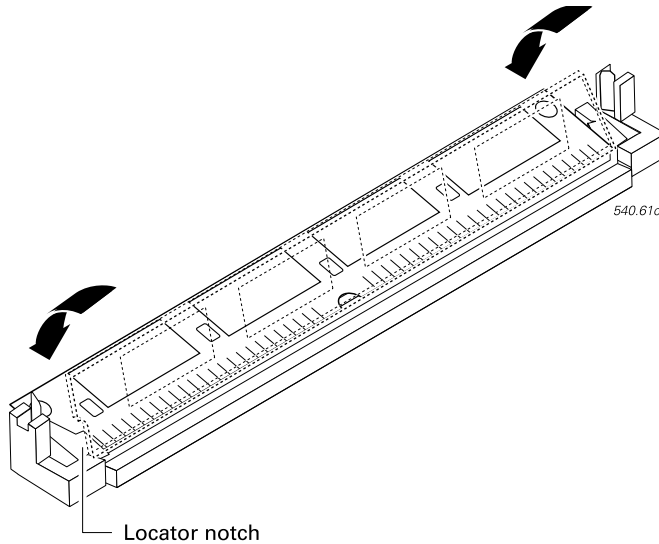


Figure 3-7. Locking the NVRAM SIMM into place

8. Install the upgraded NVRAM card into the same slot the original NVRAM card was installed.
9. Push in the system board carrier and tighten the seven thumbscrews on the back panel.
10. Turn on the filer and disk shelves.

11. Use the `sysconfig -v` command to verify that the added NVRAM has been detected.

The system displays configuration information for the filer. The NVRAM information is included in the **NVRAM** section of the configuration information screen, as shown in the following example:

```
Slot 6: NVRAM (NetApp NVRAM I)
      Memory Size: 4 MB
      Battery 1 Status: 100% (3.30v)
      Battery 2 Status: 100% (3.29v)
```

Removing NVRAM battery insulators

Replacement NVRAM cards are shipped from the factory with a plastic sheet inserted between the positive (+) side of batteries and the positive terminals of the battery holders. This insulator prevents the batteries from draining while the card is stored. The insulator must be removed before installing the NVRAM card in the filer.

To remove the battery insulator, grip the insulator and pull it out from between the battery and the positive terminal on the battery holder.

Replacing NVRAM batteries

To protect data integrity during a power failure, replace both lithium batteries when the filer indicates that the batteries are low. Figure 3-8 shows the battery locations.

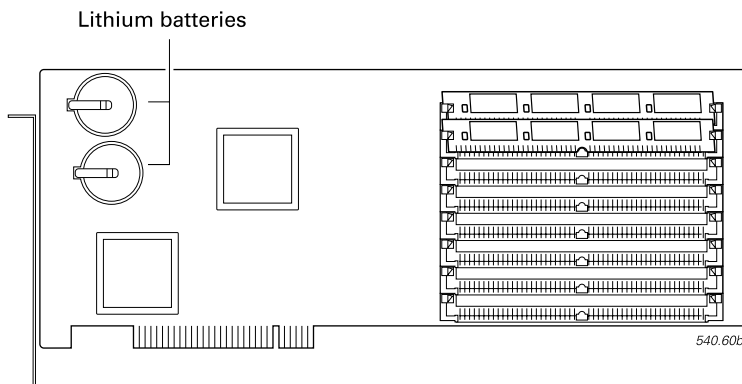


Figure 3-8. NVRAM lithium battery locations

To replace the NVRAM lithium batteries, follow these steps:



WARNING: There is danger of explosion if the batteries are replaced incorrectly. Also, replace the batteries with the same or equivalent 3-volt, 500-mA (2450 series) battery. The name of the manufacturer and the battery model number should be printed on the battery.

1. If you are replacing batteries on an NVRAM card that is already installed in the filer:
 - a. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

- b. Turn off the filer and disk shelves.



CAUTION: You must turn off the filer; otherwise, the NVRAM data will be lost.

- c. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.
- d. Remove the NVRAM card from the expansion slot, and set the card aside on an antistatic surface.

Refer to “Replacing or removing an existing expansion card” on page 3-16 for information about how to remove the NVRAM card.

2. Lift up the lithium battery while pushing out the battery towards the opening side of the battery holder (see Figure 3-9).

You can insert a nonconducting tool such as a credit card to help lift up the battery.



CAUTION: Do not bend the metal clip because this will damage the connection between the battery and the NVRAM card.

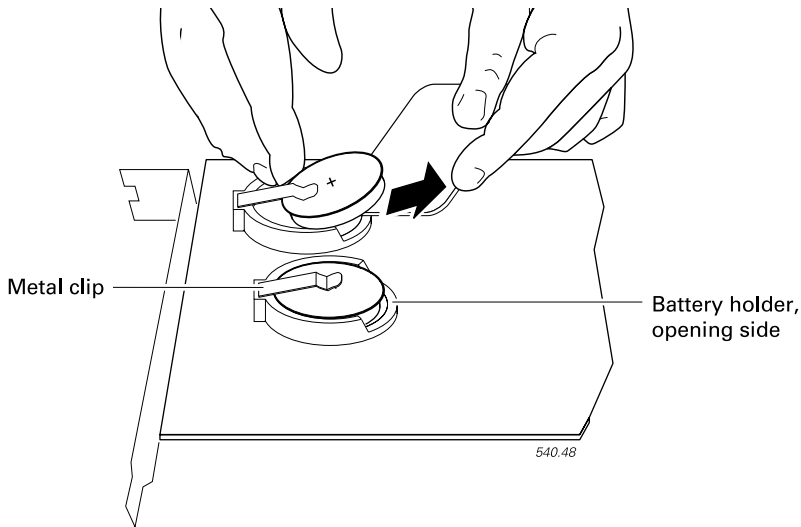


Figure 3-9. NVRAM lithium batteries connection

3. Dispose of the old batteries according to the manufacturer's instructions that come with the replacement batteries.



WARNING: Dispose of used batteries according to the manufacturer's instructions.

4. Turn the new battery with the positive side up (marked with a "+").
5. Push the battery through the opening side of the battery holder and under the metal clip so that the battery lies flush in its battery holder.
6. Install the upgraded NVRAM card into the same slot the original NVRAM card was installed.
7. Push in the system board carrier and tighten the seven thumbscrews.
8. Turn on the filer and disk shelves.

9. Use the `sysconfig -v` command to verify the voltage of the new NVRAM batteries.

The system displays configuration information for the filer. The NVRAM information is included in the `NVRAM` section of the configuration information screen, as shown in the following example:

```
Slot 6: NVRAM (NetApp NVRAM I)
Memory Size: 2 MB
Battery 1 Status: 100% (3.30v)
Battery 2 Status: 100% (3.29v)
```

Installing or replacing expansion cards

This section describes the steps involved in replacing an existing expansion card or installing a new expansion card. Depending on the type of card you are installing, you may need to prepare the card for installation. Refer to “Preparing expansion cards” on page 3-5 for information about how to prepare certain expansion cards.

Replacing or removing an existing expansion card

To replace expansion cards, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. Note which cables (if any) are connected to the connectors on the front of the expansion card and then disconnect the cables.
4. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.

5. If you are replacing or removing the environmental card, disconnect the following cables from the internal connectors on the top of the card (see Figure 3-10):
- P2 fan assembly cable
 - P5 LCD control panel cable
 - P1 input/output cable
 - P6 input cable

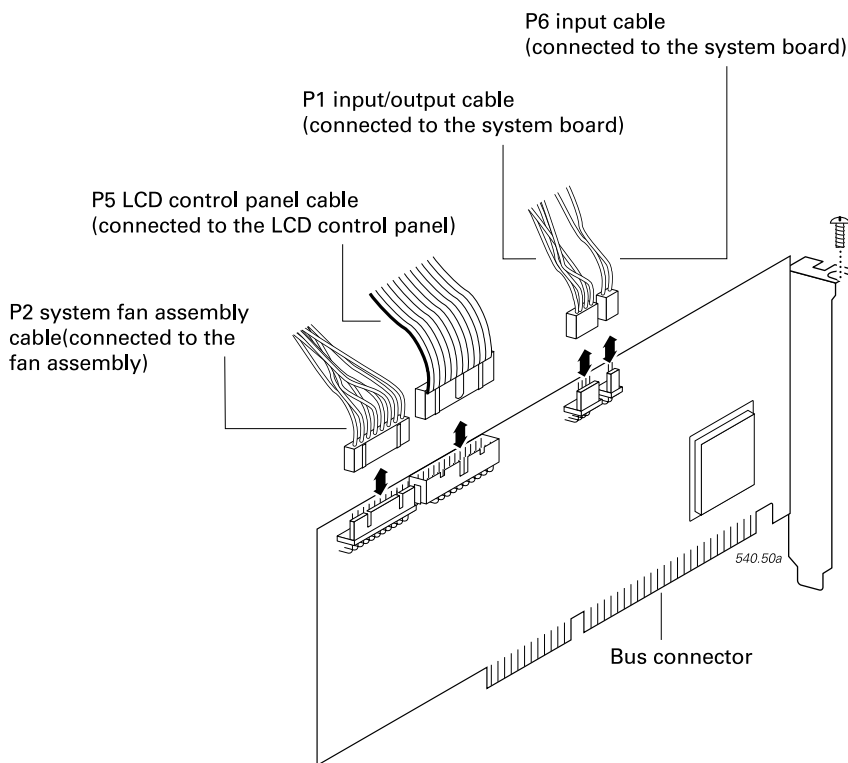


Figure 3-10. Environmental card internal cable connections

6. If you are replacing or removing the dual-channel, differential, fast wide SCSI card, disconnect the internal fast wide SCSI cable from the internal connector on the top of the card (see Figure 3-11).

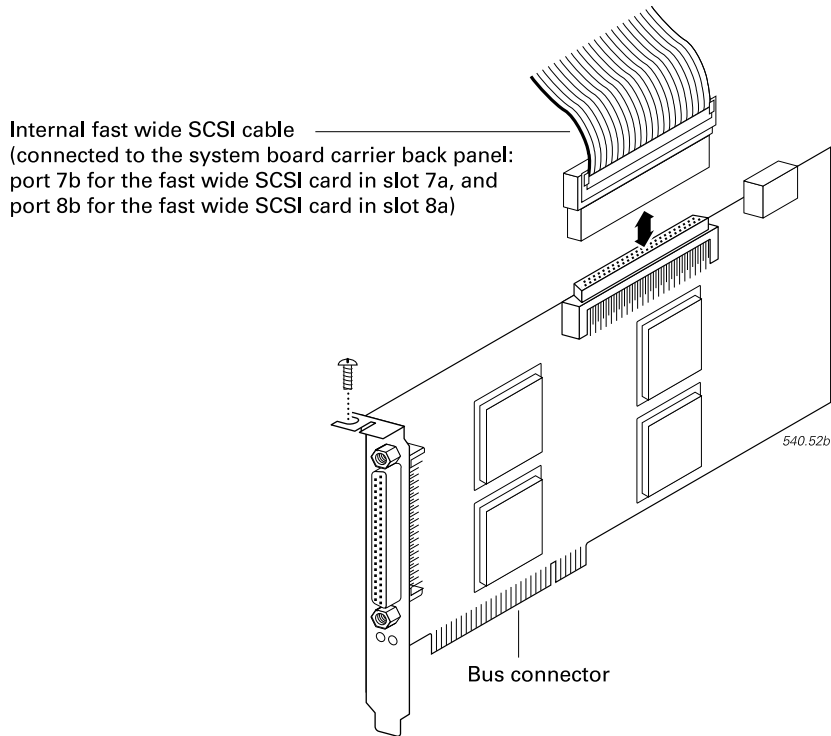


Figure 3-11. Dual-channel, differential SCSI card internal cable connection

7. If you are replacing or removing the dual-channel, single-ended, fast wide SCSI card, disconnect the internal fast wide SCSI cable from the internal connector on the top of the card (see Figure 3-12).

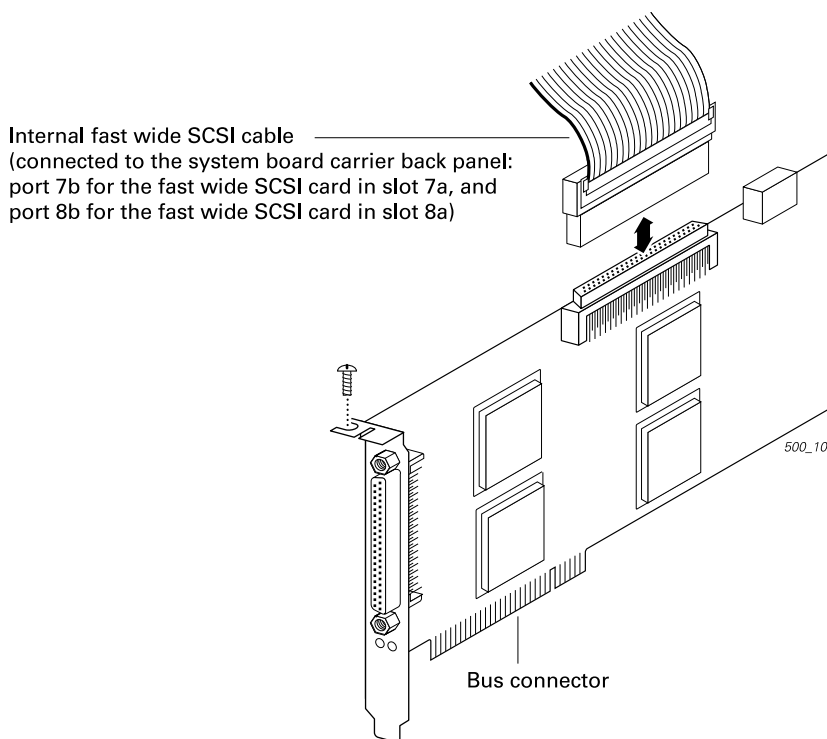


Figure 3-12. Dual-channel, single-ended SCSI card internal cable connection

8. If you are replacing or removing a fast narrow SCSI card that is connected to an internal tape drive in the NetApp F540, disconnect the fast narrow SCSI cable from the internal connector on the top of the card (see Figure 3-13).

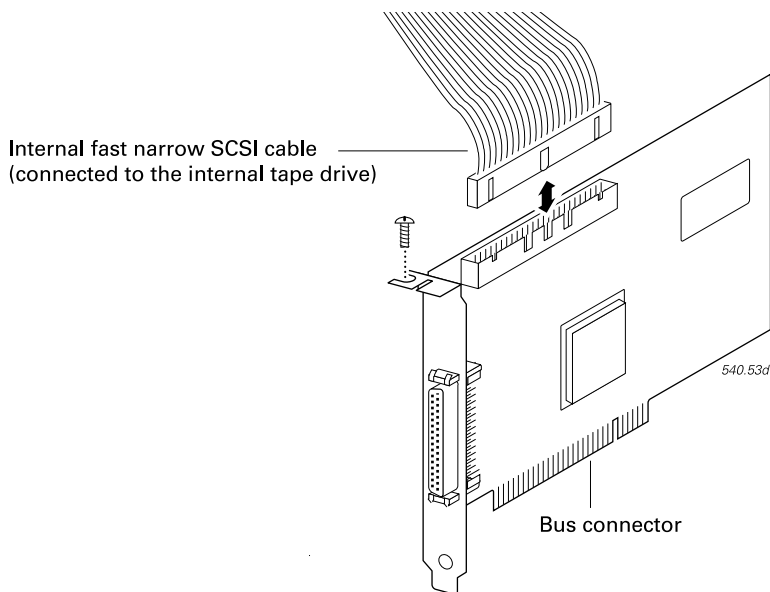


Figure 3-13. Fast narrow SCSI card internal cable connection

9. Remove the screw holding the expansion card faceplate to the rear panel bracket.

Save the screw for reinstalling the unit.

10. Pull upward on the top edge of the expansion card and lift it out of the cabinet (see Figure 3-14).

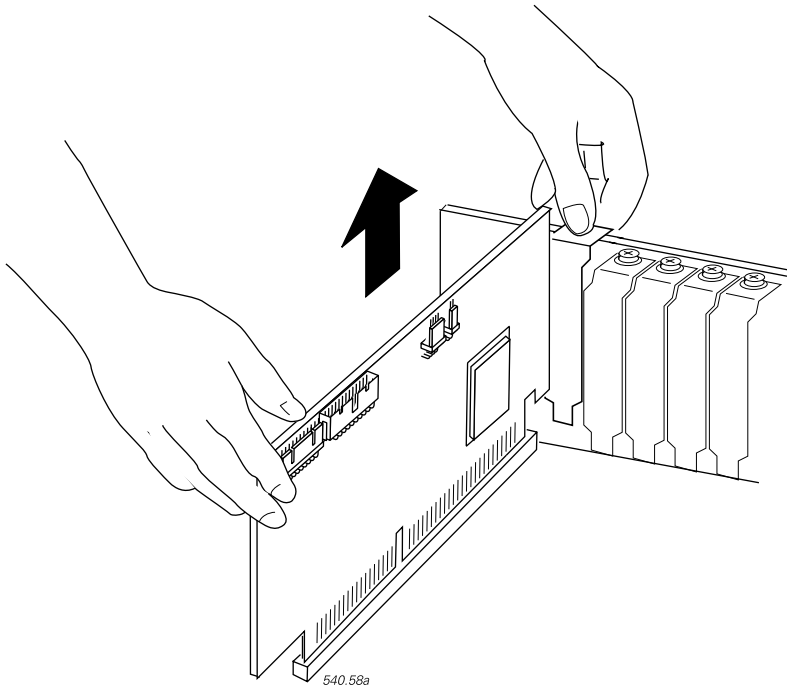


Figure 3-14. Removing an expansion card

11. If you are not installing a replacement card, install a slot cover using the screw you saved in step 9, and then skip to step 19.
12. If you are installing a replacement card, pull the replacement card out of its antistatic bag and put the card you are replacing into the same antistatic bag.

13. Install the replacement expansion card as follows (see Figure 3-15):

- a. Hold the card by its top edge, with the faceplate near your left hand.
- b. Lower the card into the slot until its connector edge meets the grooves in the system board expansion slot.

The faceplate of the card should be in position against the rear panel, and should cover the endplate slot on the rear panel.

- c. Press carefully on the top edge of the card until the edge connector is seated in the system board expansion slot.
- d. Replace the faceplate screw to secure the card to the rear panel of the chassis.

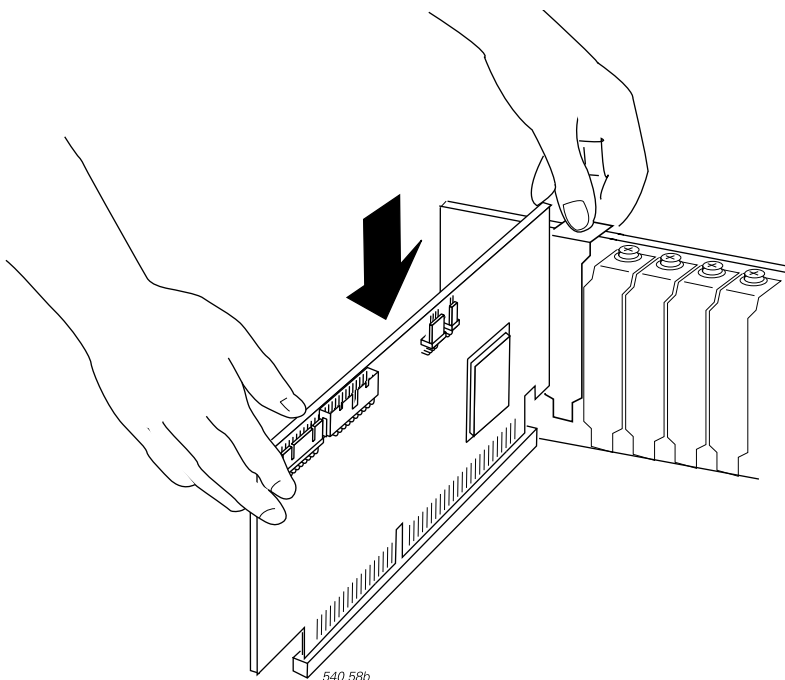


Figure 3-15. Installing an expansion card

14. If you are installing an environmental card, reconnect the cables to the internal connectors on the top of the card (see Figure 3-10 on page 3-17).
15. If you are installing a dual-channel, differential fast wide SCSI card, reconnect the SCSI cable to the internal connector on the top of the card (see Figure 3-11 on page 3-18).
16. If you are installing a dual-channel, single-ended fast wide SCSI card, reconnect the SCSI cable to the internal connector on the top of the card (see Figure 3-12 on page 3-19).
17. If you are installing a fast narrow SCSI card that will be connected to an internal tape drive in the NetApp F540, reconnect the SCSI cable to the internal connector on top of the card (see Figure 3-16).

Make sure the external SCSI terminator is attached to the SCSI connector on the card faceplate if an external tape device is not connected to the filer.

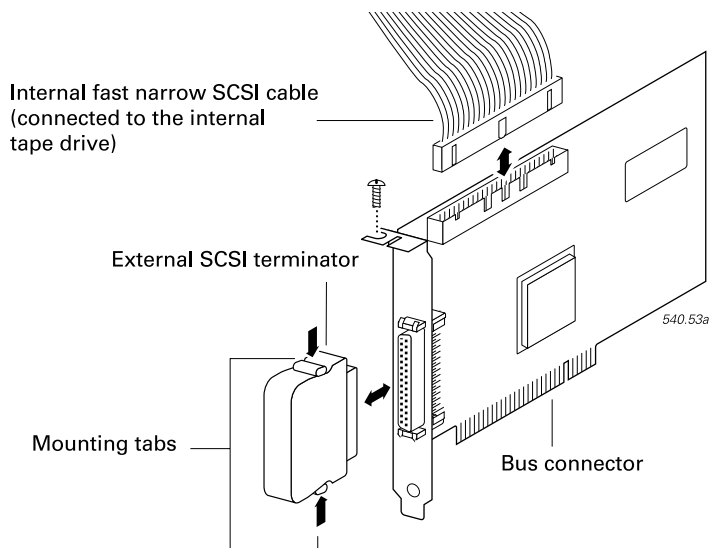


Figure 3-16. Fast narrow SCSI card (internal tape drive connections)

18. Reconnect the cables to the external connectors on the replacement expansion card.
19. Push in the system board carrier and tighten the seven thumbscrews on the back panel.
20. Turn on power to the filer and disk shelves.

Installing a new expansion card

This section describes the procedure for adding a new expansion card to the filer. Depending on the type of card you are installing, you may need to prepare the card for installation. Refer to “Preparing expansion cards” on page 3-5 for information about how to prepare certain expansion cards.

To add an expansion card to a filer, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.
4. Identify the system board expansion card slot where the new expansion card will be installed.

Refer to the “NetApp on the Web” (NOW) web page at <http://now.netapp.com> for information about expansion slot assignments.

5. Remove the screw holding the slot cover to the back panel of the system board carrier. Save the screw for reinstalling the unit.
6. If you are installing a dual-channel (differential or single-ended) fast wide SCSI card into slot 7a:
 - a. Remove the port 7b metal cut-out plate on the system board carrier back panel by inserting a screwdriver (from the inside of the system board carrier) into the center hole and pushing out the cut-out plate (see Figure 3-17). Discard the cut-out plate.

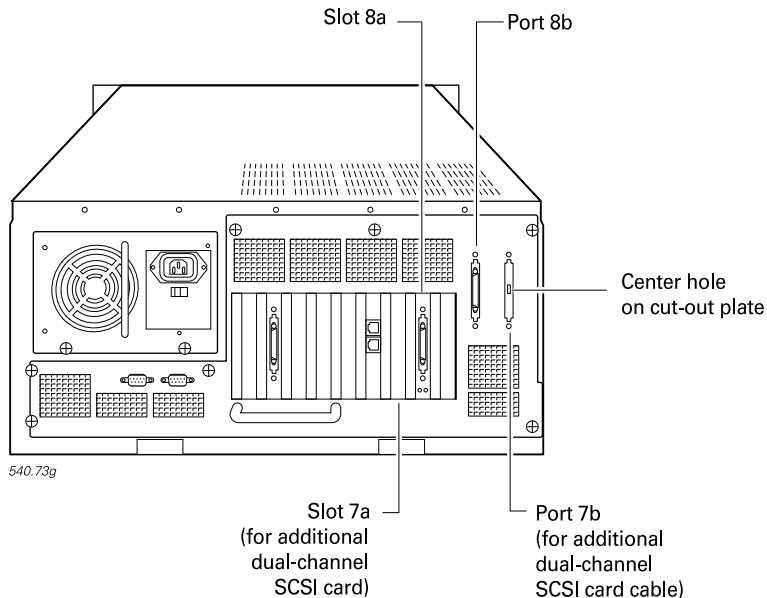


Figure 3-17. Dual-channel SCSI card port 7b location

- b. Insert the dual-channel SCSI cable (included with the replacement dual-channel SCSI card) into port 7b from the inside of the system board carrier.

The other end of this SCSI cable will be connected to the internal SCSI connector on the dual-channel SCSI card.

- c. Insert and tighten the two screws (from the outside of the system board carrier) to secure the SCSI cable to port 7b.
7. If you are installing a new fast narrow SCSI card in the NetApp F540 and you have an internal tape drive installed, call Network Appliance Technical Support for information about configuring the termination on the card.
8. Hold the card by its top edge, with the faceplate near your left hand.
9. Lower the card into the slot until its connector edge meets the grooves in the system board expansion slot.

The faceplate of the card should be in position against the rear panel, and should cover the endplate slot on the rear panel.

10. Press carefully on the top edge of the card until the edge connector is seated in the system board expansion slot.
11. Replace the faceplate screw to secure the card to the rear panel of the chassis.

12. If you installed an additional dual-channel SCSI card in slot 7a, connect the internal fast wide SCSI cable (from port 7b) to the internal connector on the SCSI card.

Figure 3-18 shows the internal cable connection for a differential SCSI card. Figure 3-19 shows the internal cable connection for a single-ended SCSI card. The other end of the SCSI cable is connected to port 7b on the system board carrier back panel.

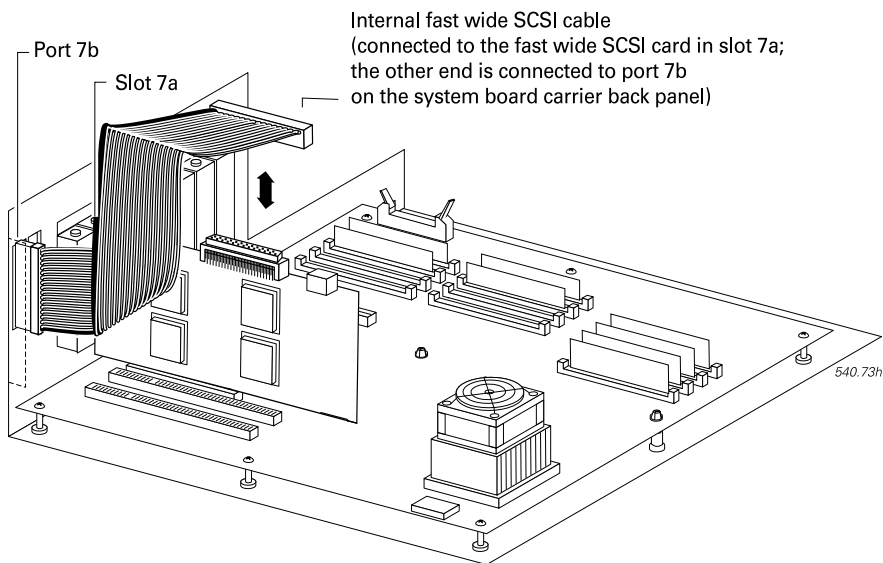


Figure 3-18. Dual-channel, differential SCSI card internal cable connection

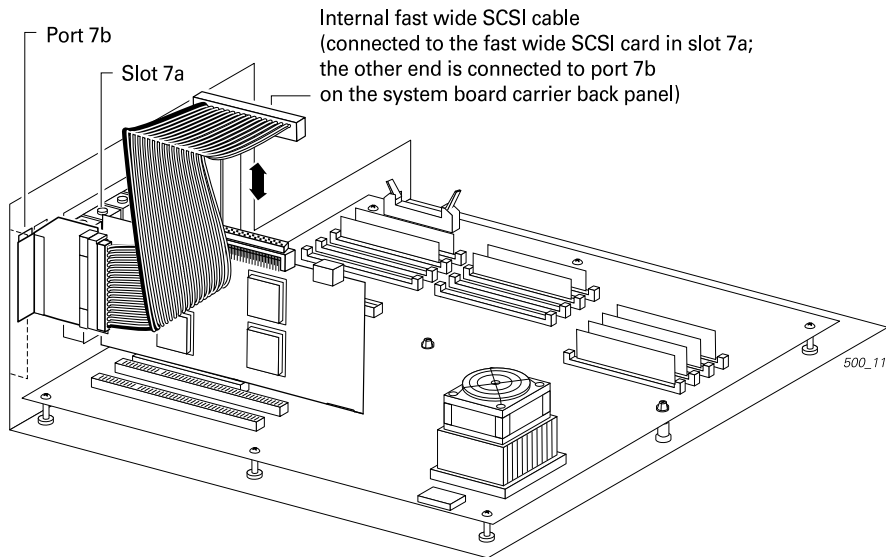


Figure 3-19. Dual-channel, single-ended SCSI card internal cable connection

13. Connect the appropriate cables to the connectors on the front of the expansion card.
14. Push in the system board carrier and tighten the seven thumbscrews on the back panel.
15. Turn on the filer and disk shelves.

Chapter 4: Storage devices

This chapter provides the procedures for removing and installing the internal diskette drive and the internal DLT tape drive. This chapter also provides information about how to use drive carriers if the replacement drive you obtained does not come installed in a drive carrier.

The internal DLT tape drive is an optional unit in the NetApp F540. If you have a DLT tape drive, the DLT tape drive is attached to the diskette drive by four screws. Figure 4-1 shows the diskette drive and the DLT tape drive attached as one assembly.

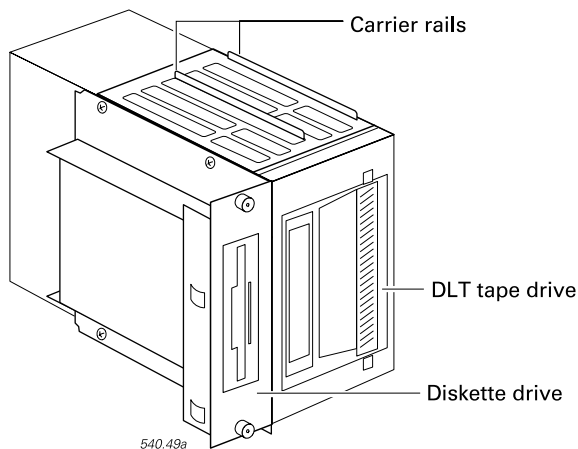


Figure 4-1. Diskette drive and DLT tape drive assembly

Replacing the diskette drive

Figure 4-2 shows the diskette drive and its mounting hardware.

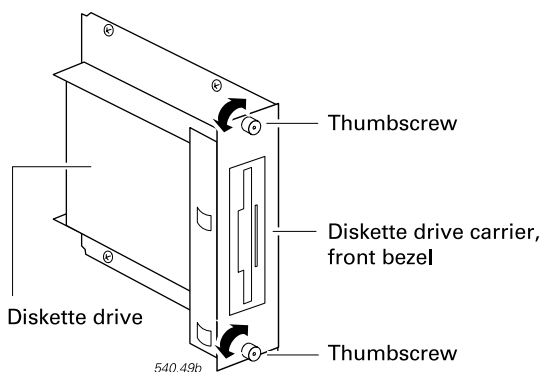


Figure 4-2. Diskette drive

Removing the diskette drive

To remove the diskette drive, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. On NetApp F540 systems, slide the front panel door to the left. On NetApp F520 systems, remove the front panel door.

To remove the NetApp F520 door, press in on the tab located on the edge of the door that is closest to the AC power switch on the front panel. While pressing the tab, lift the door out of the front panel.

4. Loosen the two thumbscrews on the diskette drive carrier front bezel.
5. Pull out the diskette drive from the drive bay.
6. Disconnect the following cables from the connectors on the back of the diskette drive (see Figure 4-3):
 - a. Disconnect the P6 diskette drive cable from the data connector.

The other end is connected to the J7 connector.

- b. Disconnect the P3 power cable from the power connector.

The other end is connected to the power supply.

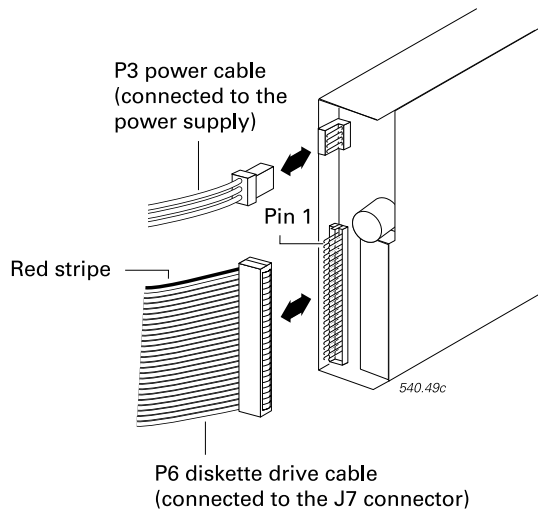


Figure 4-3. Diskette drive connections

7. If you need to remove the diskette drive from its drive carrier:
 - a. Remove the four carrier screws on the diskette drive carrier—two on each side of the diskette drive (see Figure 4-4).

Save the screws for reinstalling the unit.

- b. Slide out the diskette drive from the drive carrier.

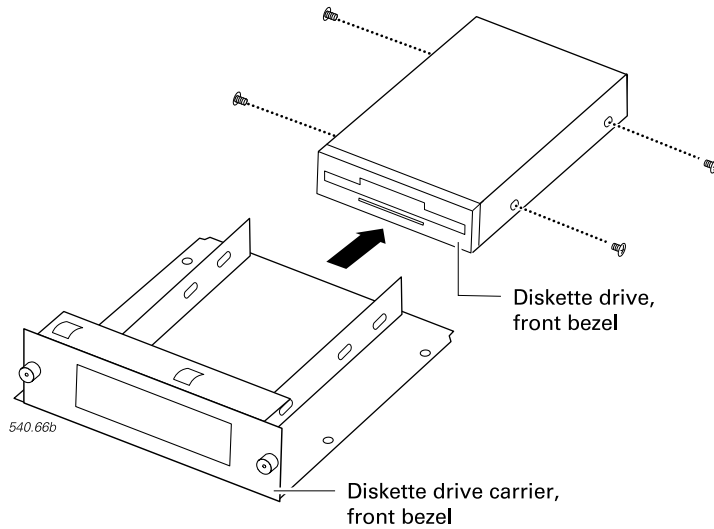


Figure 4-4. Removing the diskette drive from its carrier

Installing the diskette drive

To install the diskette drive, follow these steps (see Figure 4-5):

1. If you need to install the diskette drive into a drive carrier:
 - a. Turn the diskette drive so that its front bezel is aligned with the front bezel of the diskette drive carrier, and the top of the diskette drive is facing up.
 - b. Slide the diskette drive into the drive carrier.
 - c. Replace the four carrier screws on the diskette drive carrier—two on each side of the diskette drive.

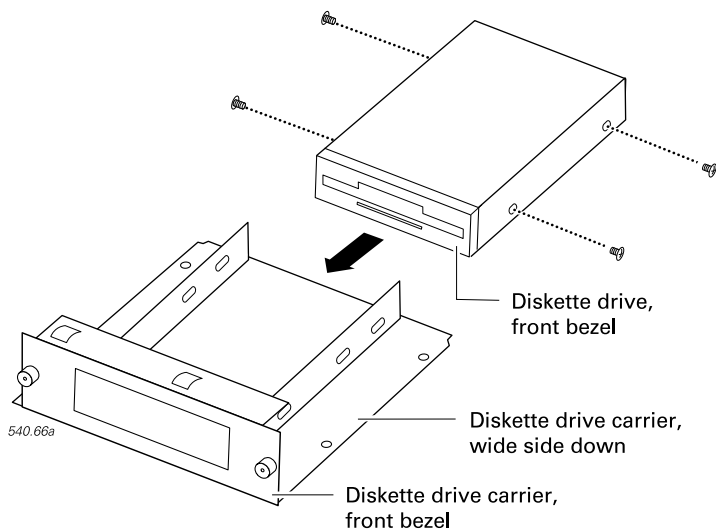


Figure 4-5. Installing the diskette drive into a carrier

2. Connect the cables to the connectors on the back of the diskette drive as follows (see Figure 4-3 on page 4-3):

- a. Connect the P6 diskette drive cable to the data connector.

The red stripe on the cable aligns with pin 1 on the connector. The other end is connected to the J7 connector.

- b. Connect the P3 power cable to the power connector.

The P3 power cable is keyed so that it can fit in only one way. The other end is connected to the power supply.

3. If you need to install a DLT tape drive in the NetApp F540, attach the diskette drive to the tape drive and install the entire diskette drive and DLT tape drive assembly in the filer (see Figure 4-1 on page 4-1).

Refer to “Installing the DLT tape drive” on page 4-11 for information about how to attach the diskette drive to the tape drive and install the assembly in the filer.

4. Turn the diskette drive so that its carrier rails align with the grooves in the drive bay.

The diskette drive is keyed so that it can fit in only one way.

5. Insert the diskette drive into the drive bay.
6. Tighten the two thumbscrews to secure the diskette drive carrier.
7. On NetApp F540 systems, slide the front panel door to the right. On NetApp F520 systems, replace the front door.
8. Turn on the filer and disk shelves.

Replacing the DLT tape drive

Figure 4-6 shows the DLT tape drive.

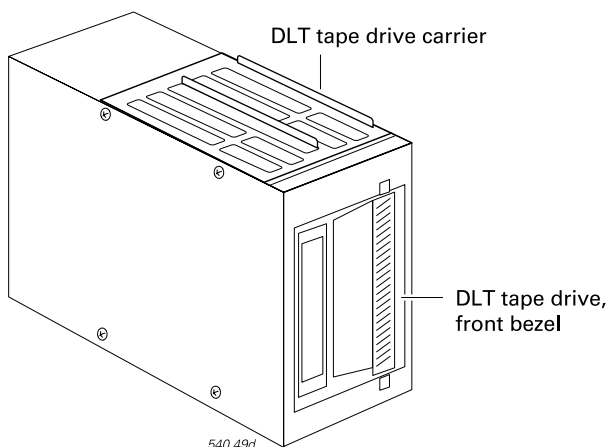


Figure 4-6. DLT tape drive

Removing the DLT tape drive

To remove the DLT tape drive, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.

3. Slide the front panel door to the left.
4. Loosen the two thumbscrews located on the diskette drive carrier front bezel.
5. Pull out the DLT tape drive and diskette drive assembly from the drive bays.
6. Disconnect the DLT tape drive cables from the connectors on the back of the drive as follows (see Figure 4-7):
 - a. Disconnect the SCSI cable from the SCSI connector. The other end is connected to the tape device SCSI card.
 - b. Disconnect the P4 or P8 power cable from the power connector. The other end is connected to the power supply.

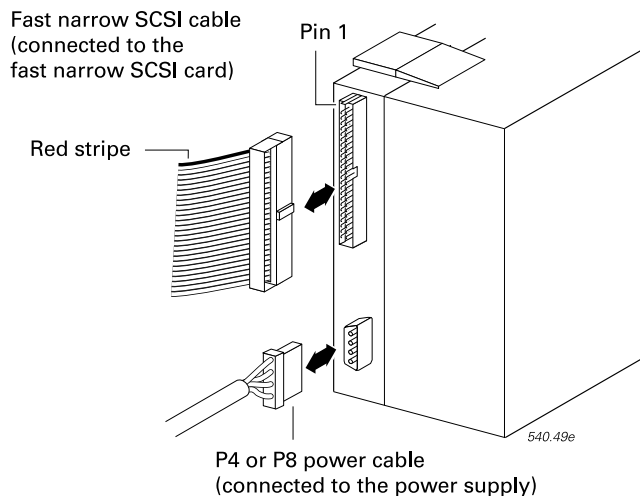


Figure 4-7. DLT tape drive connections

7. Disconnect the diskette drive cables so it is easier to maneuver around when you replace the DLT tape drive (see Figure 4-3 on page 4-3):
 - a. Disconnect the P6 diskette drive cable from the data connector on the back of the diskette drive.

The other end is connected to the J7 connector.

- b. Disconnect the P3 power cable from the power connector on the back of the diskette drive.

The other end is connected to the power supply.

8. If you need to remove the DLT tape drive from its drive carrier:
 - a. Remove the four carrier screws (on wide side of diskette drive carrier) to detach the DLT tape drive from the diskette drive (see Figure 4-8). Save the screws for reinstalling the units.

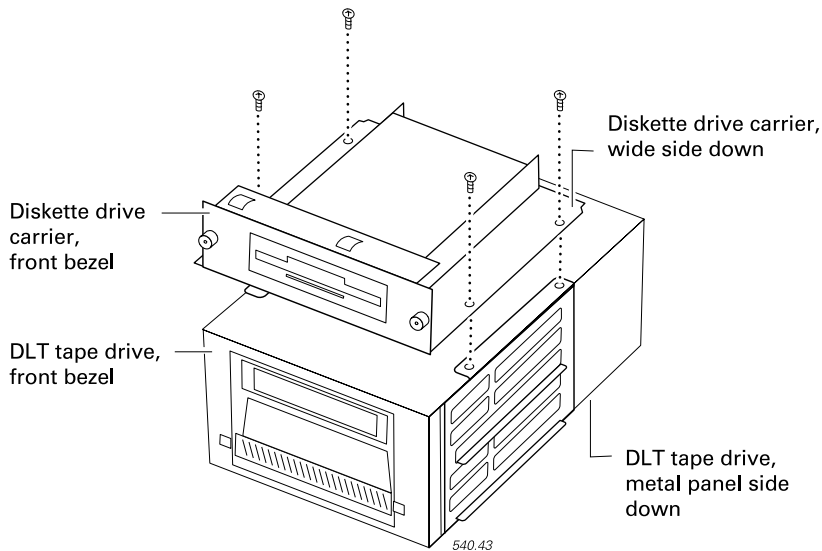


Figure 4-8. Detaching the DLT tape drive from the diskette drive

- b. Remove the four carrier screws on the DLT tape drive carrier—two on each side of the DLT tape drive (see Figure 4-9).

Save the screws for reinstalling the unit.

- c. Slide out the DLT tape drive from the drive carrier.

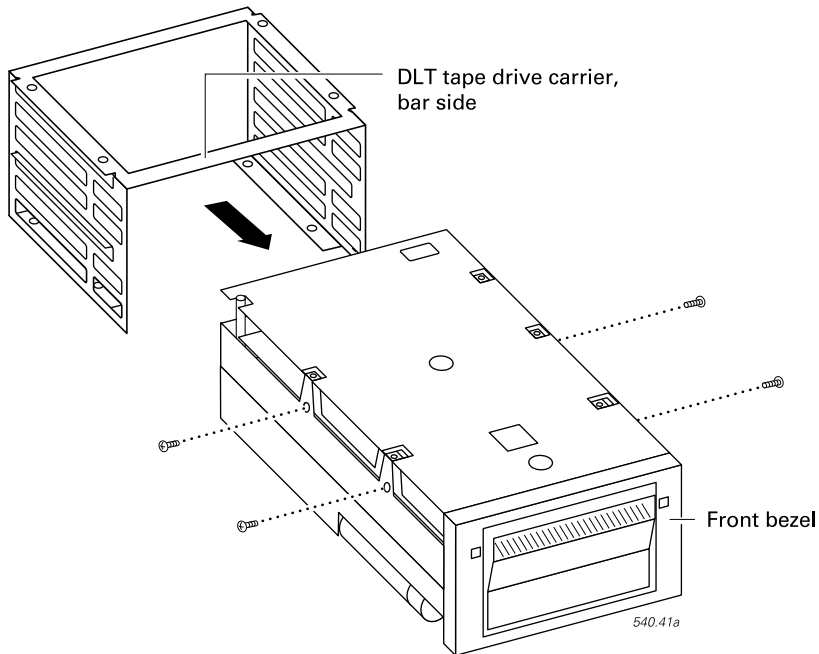


Figure 4-9. Removing the DLT tape drive from its carrier

Installing the DLT tape drive

To install the DLT tape drive, follow these steps:

- 1. Check the SCSI ID jumper setting on the new DLT tape drive.

Set the SCSI ID jumpers on the new DLT tape drive to match the jumper settings on the DLT tape drive that was removed from the filer. The SCSI ID is usually set to 6, as shown in Figure 4-10.

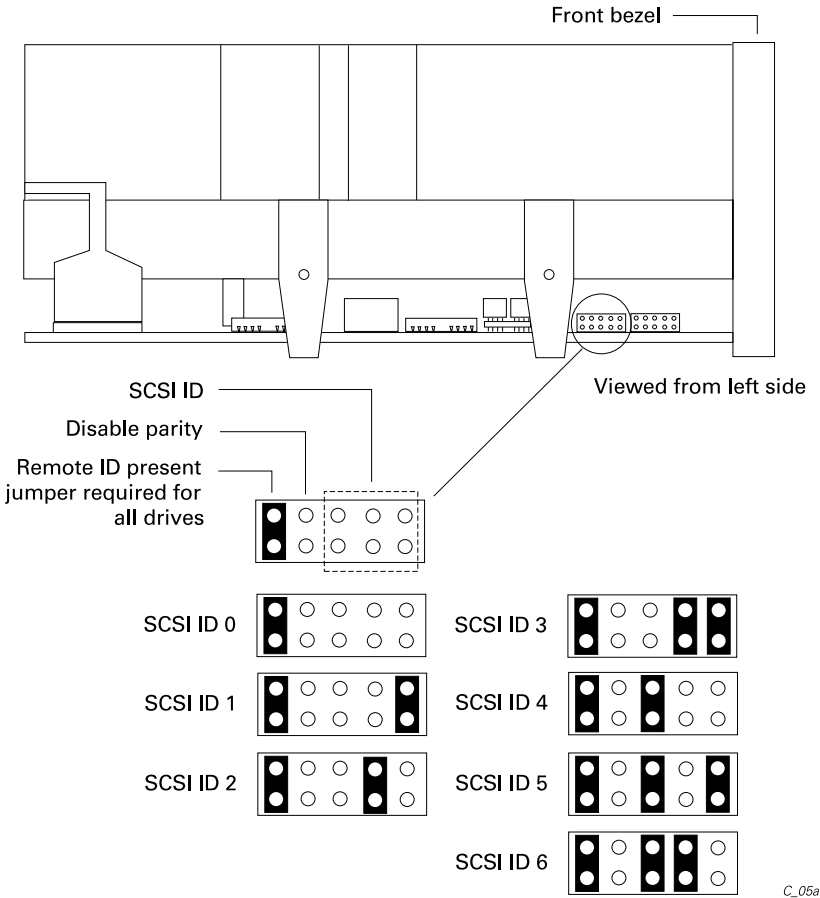


Figure 4-10. DLT tape drive SCSI ID jumper setting

2. Check the SCSI bus termination on the new DLT tape drive.

Set the SCSI bus termination on the new DLT tape drive to match the SCSI bus termination setting on the DLT tape drive that was removed from the filer. Figure 4-11 shows the different settings for the SCSI bus termination.

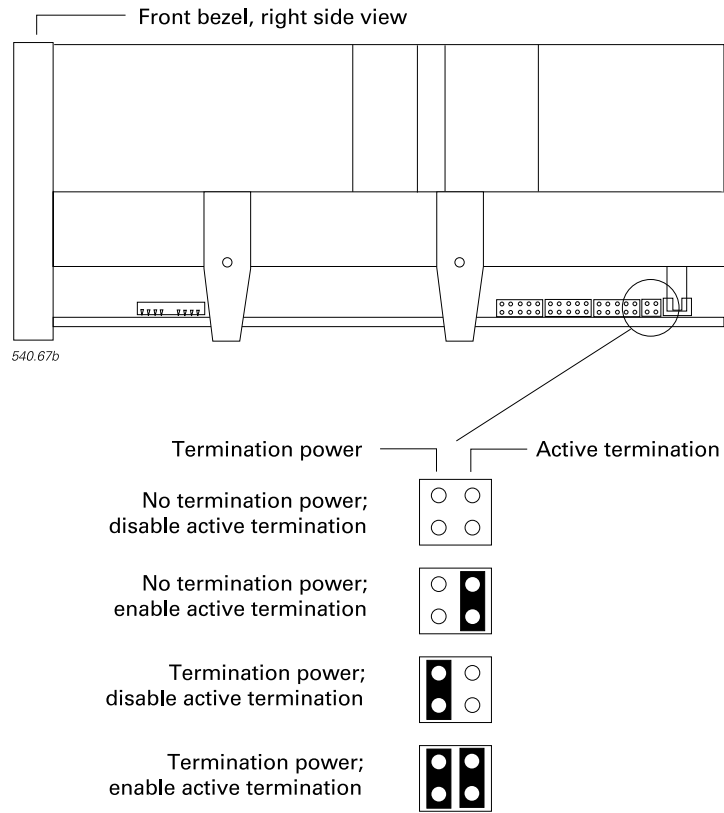


Figure 4-11. DLT tape drive SCSI bus termination setting

3. If you need to install the DLT tape drive into a drive carrier:
 - a. Turn the DLT tape drive so that its metal panel side is aligned with the bar side of the drive carrier (see Figure 4-12).
 - b. Slide the DLT tape drive into the drive carrier.
 - c. Replace the four carrier screws on the DLT tape drive carrier—two on each side of the DLT tape drive.

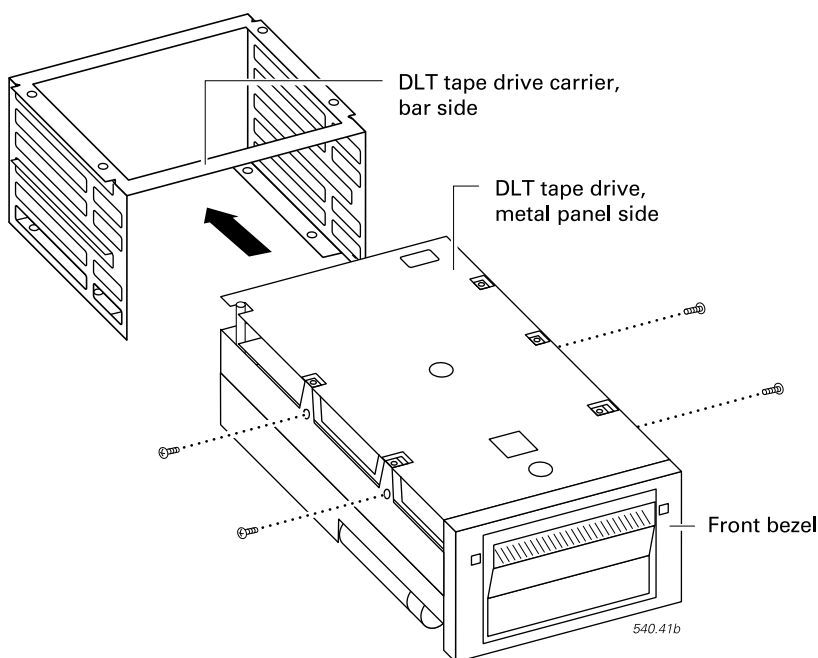


Figure 4-12. Installing the DLT tape drive into a carrier

- d. Turn the DLT tape drive so that its metal panel side is down and its front bezel is facing you.
- e. Turn the diskette drive so that its drive carrier wide side is down and its front bezel is facing you.
- f. Place the diskette drive on top of the DLT tape drive while aligning the screw holes between the two drive carriers.
- g. Insert and secure the four carrier screws (on the wide side of the diskette drive carrier) to attach the diskette drive to the DLT tape drive (see Figure 4-13).

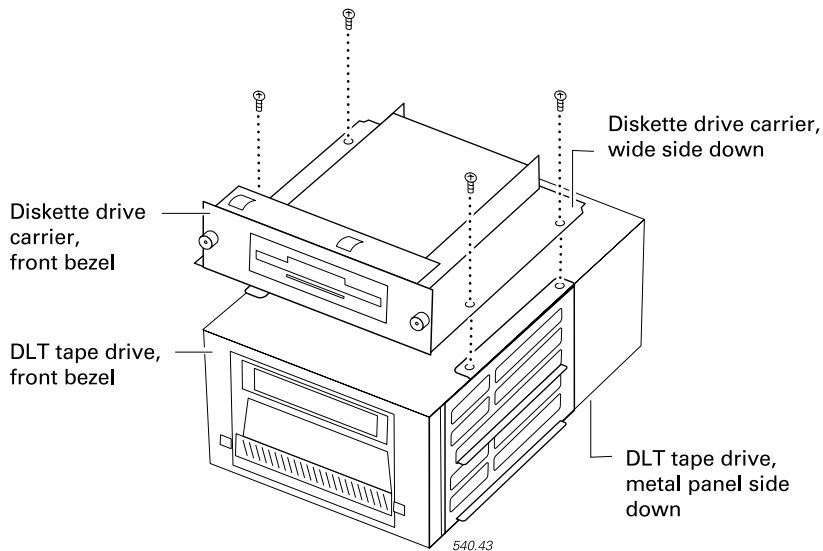


Figure 4-13. Attaching the DLT tape drive to the diskette drive

4. Reconnect cables to the connectors on the back of the DLT tape drive as follows (see Figure 4-7 on page 4-8):

- a. Connect the SCSI cable to the SCSI connector on the back of the DLT tape drive.

The other end is connected to the fast narrow SCSI card. The SCSI cable is keyed so that it can fit in only one way. Also, the red stripe on the cable aligns with pin 1 on the connector.

- b. Connect the P4 or P8 power cable to the power connector on the back of the DLT tape drive.

The other end is connected to the power supply. The P4 or P8 power cable is keyed so that it can fit in only one way. These two power cables give you the option of replacing the DLT tape drive with two tape drives.

5. If you disconnected the diskette drive cables, reconnect the cables to the connectors on the back of the diskette drive as follows (see Figure 4-3 on page 4-3):

- a. Connect the P6 diskette drive cable to the data connector.

The other end is connected to the J7 connector.

- b. Connect the P3 power cable to the power connector.

The other end is connected to the power supply.

6. Turn the DLT tape drive and diskette drive assembly so that its carrier rails align with the grooves in the drive bay.

The drive assembly is keyed so that it can fit in only one way.

7. Insert the DLT tape drive and diskette drive assembly into the drive bays (the drive assembly uses all three drive bays).

8. Tighten the two thumbscrews located on the diskette drive side to secure the drive assembly.
9. Slide the front panel door to the right.
10. Turn on the filer and disk shelves.

Chapter 5: Power supply and fans

This chapter provides the procedures for removing and installing the filer power supply, filer fan assembly, and CPU fan.



NOTE: To maintain UL, CSA, and TUV safety certifications, you must obtain the replacement power supply units from Network Appliance.

Replacing the power supply

Figure 5-1 shows the location of the filer power supply and its mounting hardware.

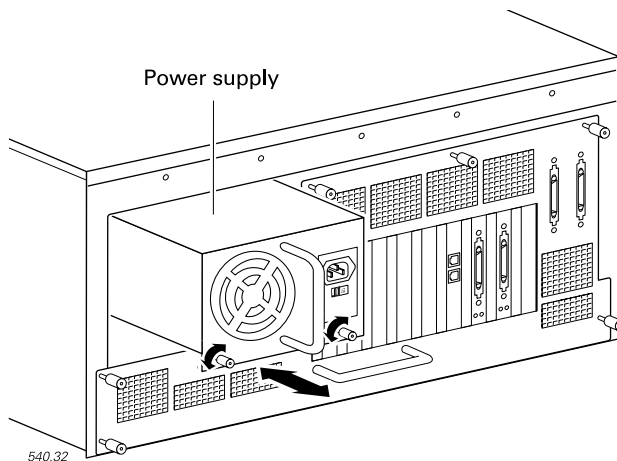


Figure 5-1. Power supply

Removing the power supply

To remove the power supply, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. Disconnect the filer AC power cord from the power outlet.

4. Disconnect the other end of the AC power cord from the AC power cord receptacle on the power supply (see Figure 5-2).
5. Loosen the two thumbscrews on the power supply.
6. Use the handle on the front of the power supply to pull the unit out of the filer.

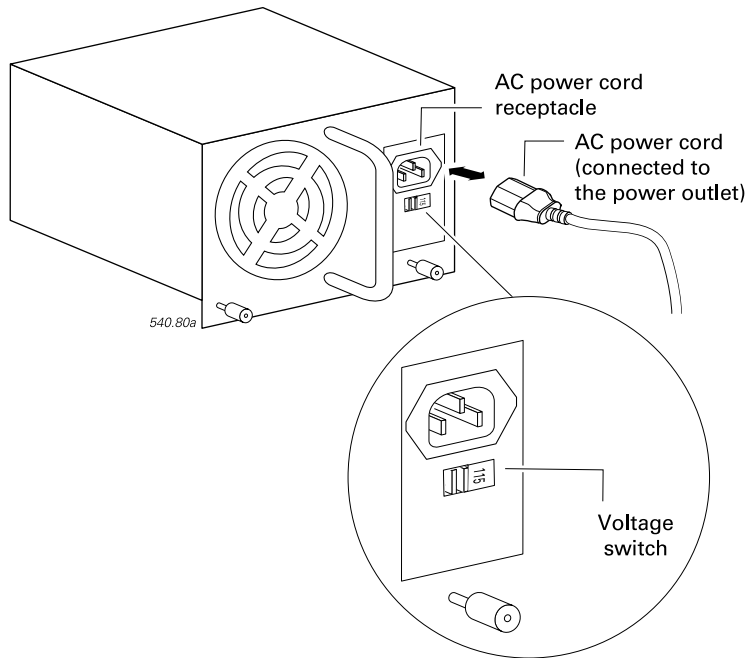


Figure 5-2. Filer power supply cable connection

Installing the power supply

To install the power supply, follow these steps:

1. Make sure the power supply is set to the appropriate voltage.

If you are using a 115-VAC power source, set the voltage to 115 VAC by pushing the voltage switch to the left to expose the number 115. If you are using a 230-VAC power source, set the voltage to 230 VAC by pushing the voltage switch to the right to expose the number 230.



WARNING: An improper voltage setting will damage the power supply.

2. Turn the power supply so that its connectors align with the connectors inside the bay.

The power supply is keyed so that it can fit in only one way.

3. Push in the power supply, slowly and firmly, until it is fully seated in the bay.
4. Tighten the two thumbscrews to secure the power supply to the filer cabinet.
5. Connect the AC power cord to the AC power cord receptacle on the power supply.
6. Connect the other end of the AC power cord to the power outlet.
7. To get access to the voltage connectors on the system board, loosen the seven thumbscrews on the back panel and pull out the system board carrier.
8. Turn on the filer and disk shelves.

9. Check the power supply output voltages on the system board power connectors using a direct current voltmeter.

Figure 5-3 shows the location of the power connectors voltage pins. Table 5-1 provides the signal level for the power connector voltage pins.

10. Push in the system board carrier and tighten the seven thumbscrews on the back panel.

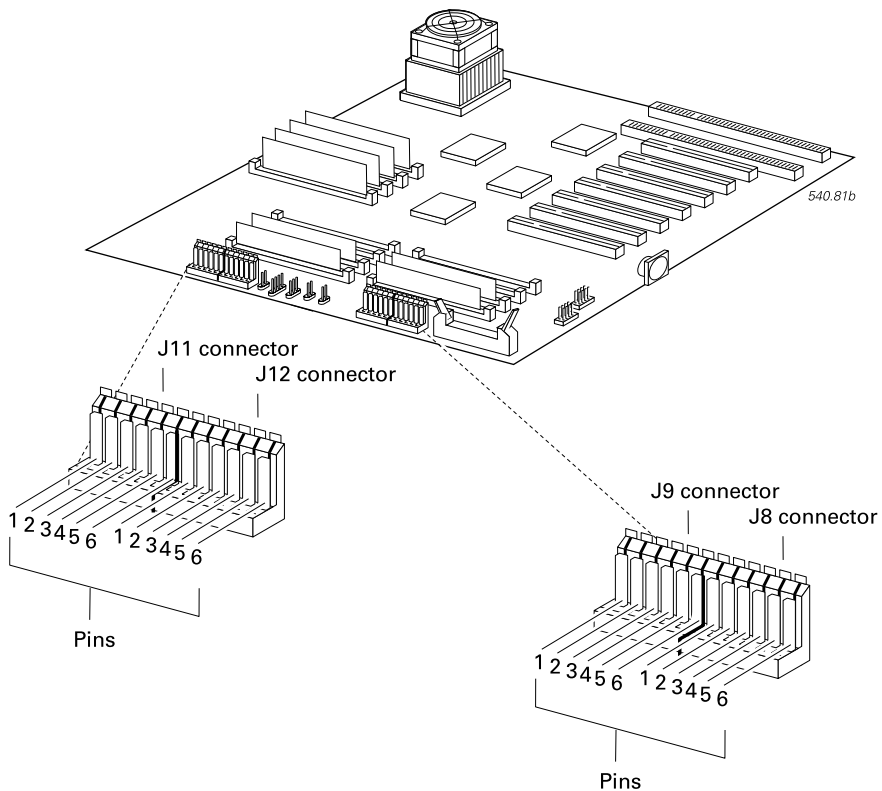


Figure 5-3. System board power connector voltage pins

Table 5-1. Power supply output voltages

Connector	Pin	Signal	Wire color
J8	1	POK (logic 1)	Orange
	2	+5V ($\pm 2\%$)	Red
	3	+12V ($\pm 3\%$)	Yellow
	4	-12V ($\pm 5\%$)	Blue
	5	Ground (COMMON)	Black
	6	Ground (COMMON)	Black
J9	1	Ground (COMMON)	Black
	2	Ground (COMMON)	Black
	3	-5V ($\pm 5\%$)	White
	4	+5V ($\pm 2\%$)	Red
	5	+5V ($\pm 2\%$)	Red
	6	+5V ($\pm 2\%$)	Red
J12	1	Ground (COMMON)	Black
	2	Ground (COMMON)	Black
	3	Ground (COMMON)	Black
	4	+3.3V ($\pm 1\%$)	Brown
	5	+3.3V ($\pm 1\%$)	Brown
	6	+3.3V ($\pm 1\%$)	Brown

Table 5-1. Power supply output voltages (continued)

Connector	Pin	Signal	Wire color
J11	1	+3.3V ($\pm 1\%$)	Brown
	2	+3.3V ($\pm 1\%$)	Brown
	3	+3.3V ($\pm 1\%$)	Brown
	4	Ground (COMMON)	Black
	5	Ground (COMMON)	Black
	6	Ground (COMMON)	Black

Replacing the fan assembly

Figure 5-4 shows the fan assembly (and its mounting hardware) on the NetApp F540 filer. Figure 5-5 shows the fan assembly (and its mounting hardware) on the NetApp F520 filer. The fan assemblies on the filers are identical with the exception of the type of fans that are installed in the assembly. The mounting hardware and internal connections for both fan assemblies are identical. The illustrations in this section show the fan assembly on the NetApp F540.



NOTE: To maintain UL, CSA, and TUV safety certifications, you must obtain the replacement fan assembly from Network Appliance. Using unapproved replacement fans voids the safety certifications.

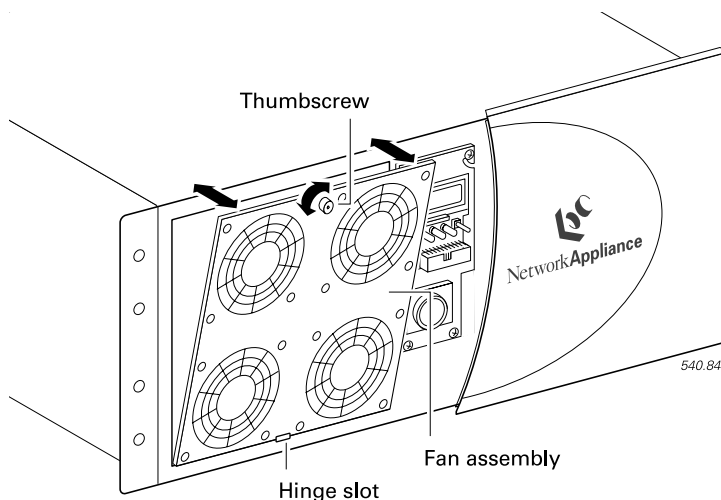
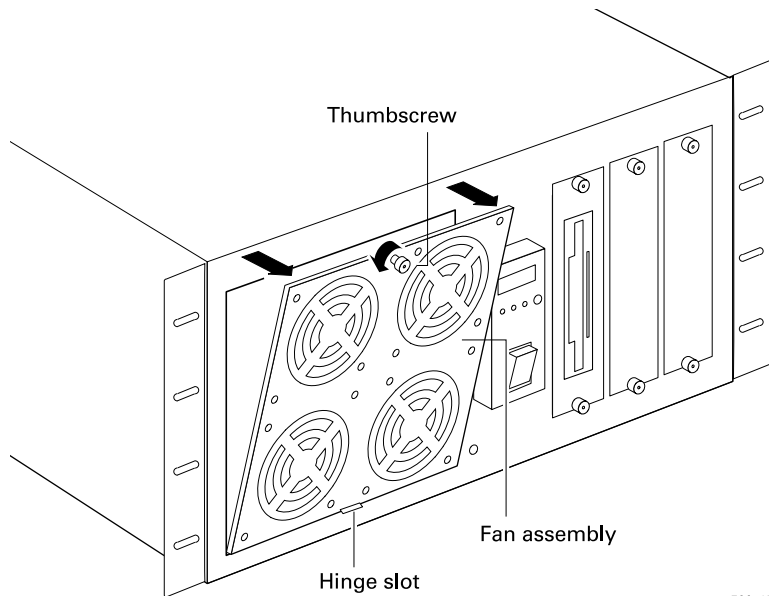


Figure 5-4. Fan assembly on the NetApp F540



500_15

Figure 5-5. Fan assembly on the NetApp F520

Removing the fan assembly

To remove the fan assembly, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.
3. Remove the front panel bezel.

4. Loosen the thumbscrew on the fan assembly.
5. Lower the fan assembly away from the cabinet.
6. Unhook the fan assembly from the hinge slot.
7. Unplug the fan assembly cable from the P2 system fan assembly cable by pressing inward on the release tab located on the cable end (see Figure 5-6). Set the fan assembly aside.

The other end of the P2 system fan assembly cable is connected to the environmental card.

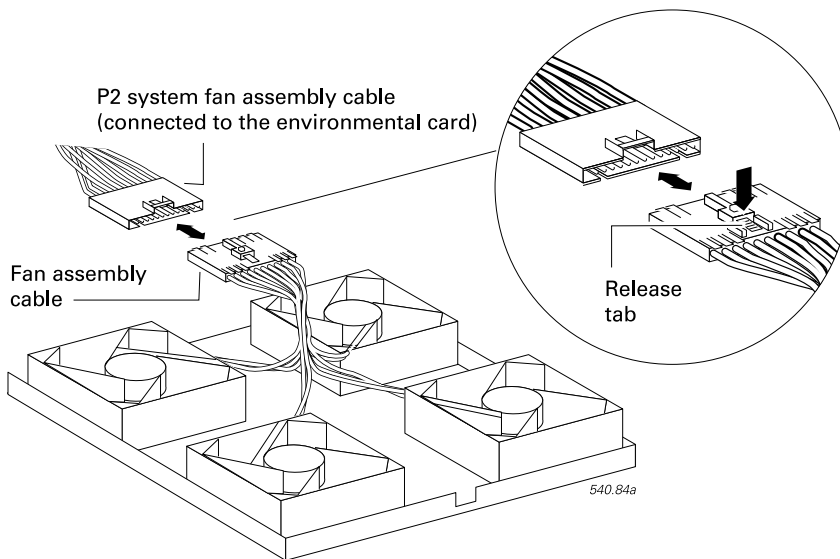


Figure 5-6. Fan assembly cable connection

Installing the fan assembly

To install the fan assembly, follow these steps:

1. Plug the fan assembly cable into the P2 system fan assembly cable until the release tab clicks in place (see Figure 5-6 on page 5-10).

The other end of the P2 system fan assembly cable is connected to the environmental card. The cable is keyed so that it can fit in only one way.

2. Hook the fan assembly into the hinge slot.
3. Raise the fan assembly towards the cabinet.
4. Tighten the thumbscrew to secure the fan assembly to the filer cabinet.
5. Replace the front panel bezel.
6. Turn on the filer and disk shelves.
7. Check that the fans are operating.

Replacing the CPU fan

Figure 5-7 shows the location of the CPU fan and the CPU fan cable connections.

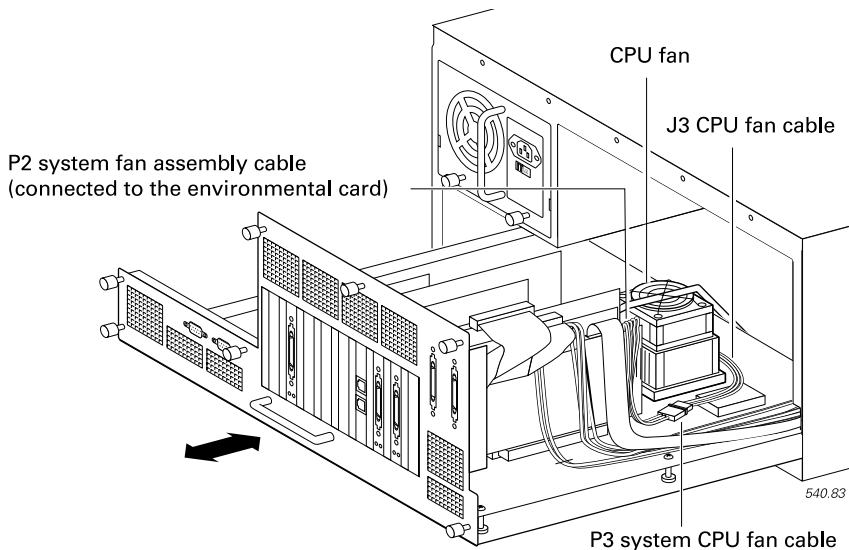


Figure 5-7. CPU fan

Removing the CPU fan

To remove the CPU fan, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```

2. Turn off the filer and disk shelves.

3. Loosen the seven thumbscrews on the back panel and pull out the system board carrier.
4. Cut the CPU fan tie wrap using scissors or wire cutters with insulated handles, and discard the tie wrap (see Figure 5-8).

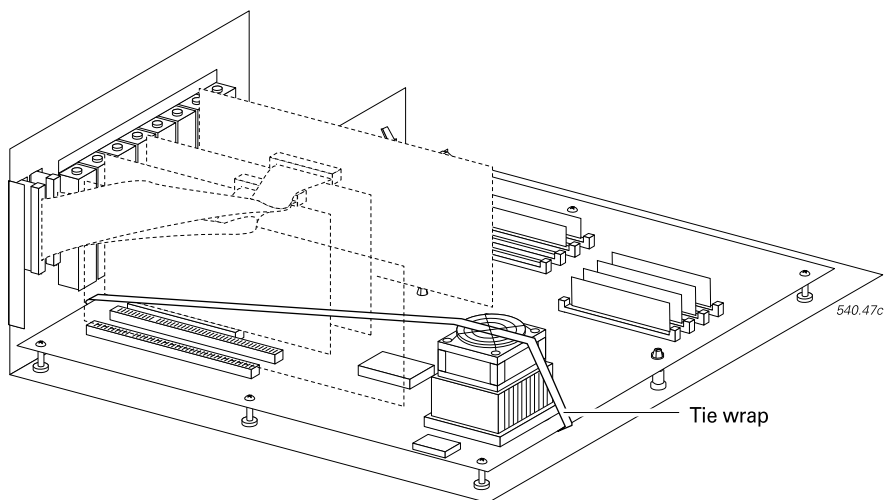


Figure 5-8. CPU fan tie wrap

5. Unplug the J3 CPU fan cable from the P3 system CPU fan cable (see Figure 5-9).

The P3 system CPU fan cable branches from the P2 system fan assembly cable that is connected to the environmental card.

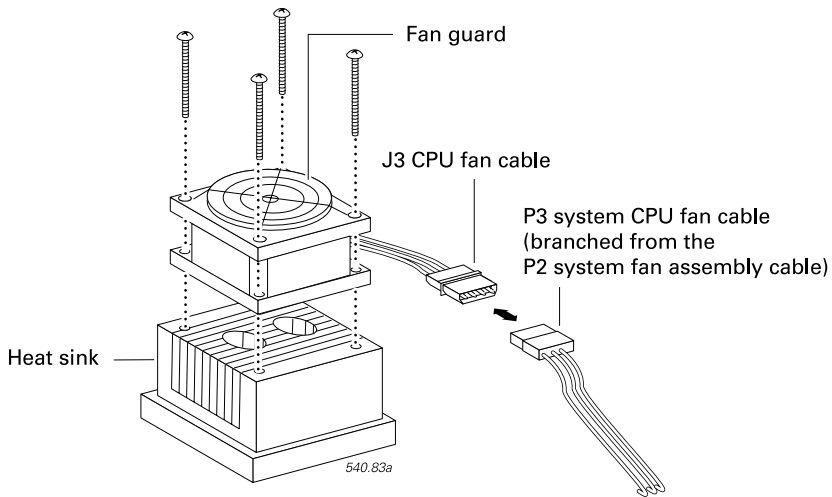


Figure 5-9. CPU fan cable connection

6. Loosen the four screws on top of the CPU fan (see Figure 5-9).
7. Lift up the CPU fan and the fan guard from the heat sink.
8. Set the CPU fan and the fan guard aside.

Installing the CPU fan

To install the CPU fan, follow these steps:

1. Turn the CPU fan so that the J3 CPU fan cable is towards the P3 system CPU fan cable.
2. Place the CPU fan over the heat sink.
3. Replace the fan guard over the CPU fan.
4. Replace the four screws to secure the CPU fan onto the heat sink.



CAUTION: Do not over-tighten the screws that secure the CPU fan to the heat sink; you could damage the heat sink if you over-tighten the screws.

5. Plug the J3 CPU fan cable into the P3 system CPU fan cable (see Figure 5-9 on page 5-14).

The P3 system CPU fan cable branches from the P2 system fan assembly cable that is connected to the environmental card. The cable is keyed so that it can fit in only one way.

6. Push in the system board carrier and tighten the seven thumbscrews on the back panel.
7. Turn on the filer and disk shelves.

Chapter 6: LCD control panel

This chapter provides the procedures for removing and installing the LCD control panel.



WARNING: You must power down the filer and disconnect the filer AC power cord from the power outlet before you remove or install the LCD control panel; otherwise, personal injury will occur. The shielded power cable on the LCD control panel is a live wire if the AC power cord is still connected to the power outlet — even when the filer is turned off.

Replacing the LCD control panel

Figure 6-1 shows the location of the LCD control panel on the NetApp F540 filer. Figure 6-2 shows the location of the LCD control panel on the NetApp F520 filer.

The LCD control panels on the filers are identical with the exception of the AC power switch. The NetApp F540 filer contains a pushbutton switch, while the NetApp F520 filer contains a rocker switch. The mounting hardware and internal connections for both fan assemblies are identical. The illustrations in this chapter show the LCD control panel on the NetApp F540.

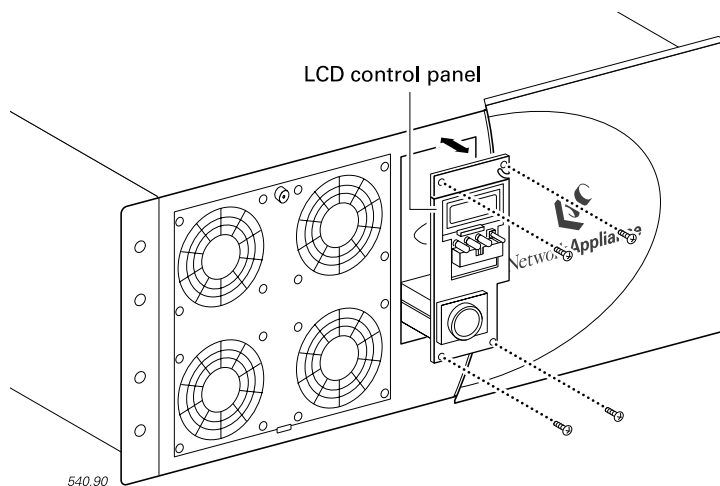
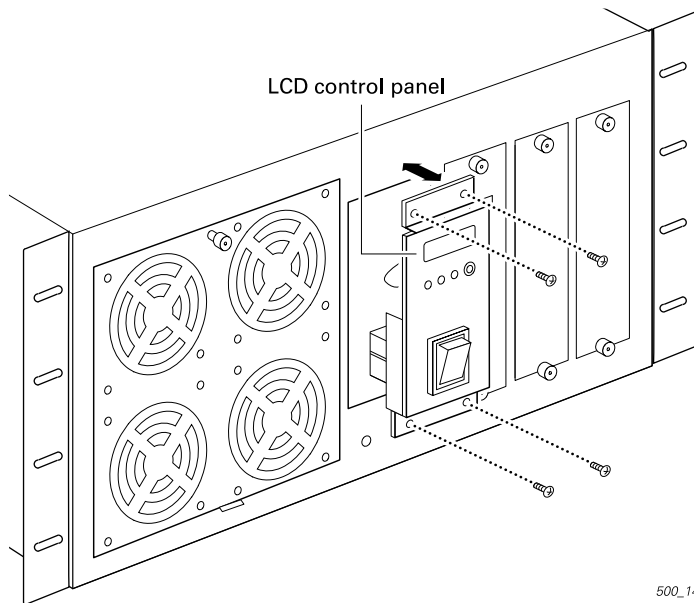


Figure 6-1. LCD control panel on the NetApp F540



500_14

Figure 6-2. LCD control panel on the NetApp F520

Removing the LCD control panel

To remove the LCD control panel, follow these steps:

1. Execute the `halt` command at the console prompt to save the contents of NVRAM to disk.

The system displays a message similar to the following message:

```
toaster> halt
Sat Mar 22 23:37:42 GMT [rc]: System shut down with
"halt" command.
Program terminated
ok
```



WARNING: You must power down the filer and disconnect the filer AC power cord from the power outlet before you remove the LCD control panel; otherwise, personal injury will occur. The shielded power cable on the LCD control panel is a live wire if the AC power cord is still connected to the power outlet — even when the filer is turned off.

2. Turn off the filer and disk shelf.
3. Unplug the AC power cord from the power outlet.

The other end is connected to the filer power supply.

4. Remove the front panel bezel.
5. Remove the four panhead screws on the LCD control panel.

Save the screws for reinstalling the unit.

6. Pull out the LCD control panel from the bay.
7. Disconnect the P9 LCD control panel cable from the ribbon connector on the back of the LCD control panel (see Figure 6-3).

The other end of this cable is the P5 connector and is connected to the environmental card.

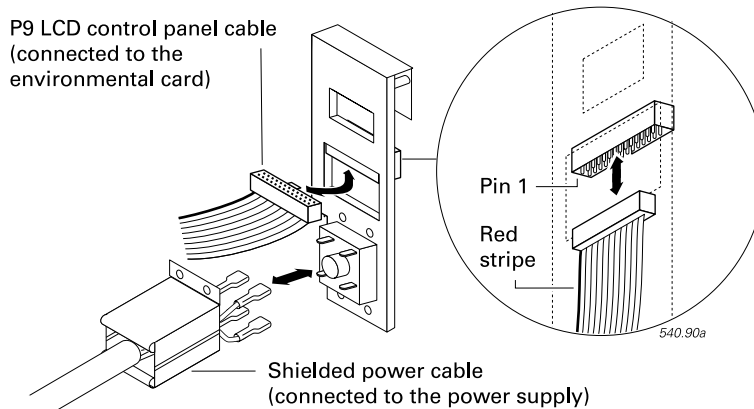


Figure 6-3. LCD control panel connections

8. Remove the four power switch screws on the front of the LCD control panel (see Figure 6-4).

Save the screws for reinstalling the unit.

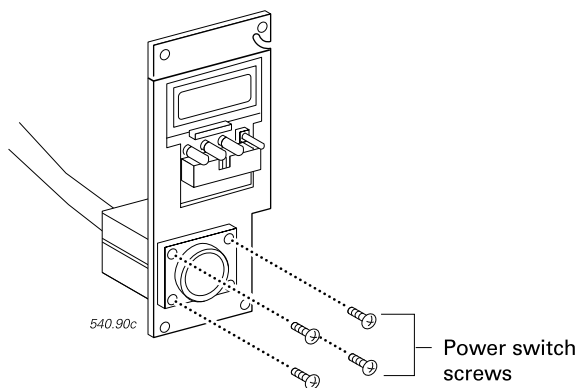


Figure 6-4. Removing the LCD control panel power switch screws

9. Disconnect the shielded power cable from the four power connectors on the back of the LCD control panel (see Figure 6-3).

Installing the LCD control panel

To install the LCD control panel, follow these steps:



WARNING: Make sure the filer is not powered and the filer AC power cord is not connected to the power outlet before you install the LCD control panel; otherwise, personal injury will occur. The shielded power cable on the LCD control panel is a live wire if the AC power cord is still connected to the power outlet — even when the filer is turned off.

1. Plug the shielded power cable into the four power connectors on the back of the LCD control panel (see Figure 6-5).

Make sure that each wire on the shielded power cable is plugged into the connector designated with the same color.

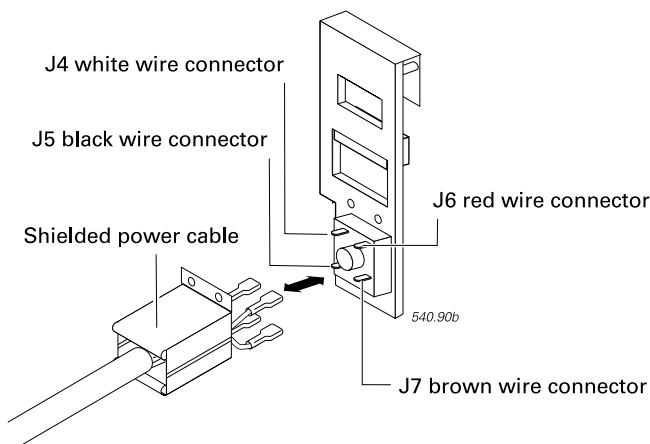


Figure 6-5. LCD control panel power connector wire colors

2. Replace the four power switch screws to secure the shielded power cable (see Figure 6-6).

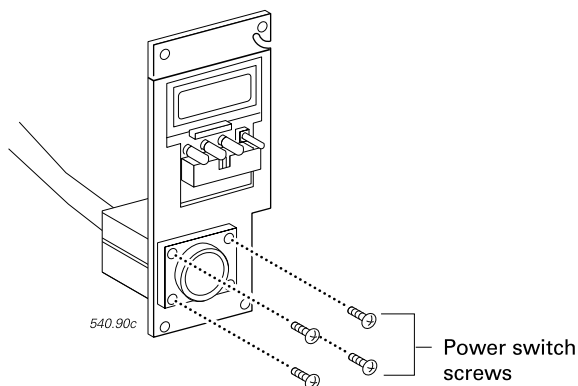


Figure 6-6. Replacing the LCD control panel power switch screws

3. Connect the P9 LCD control panel cable to the ribbon connector on the back of the LCD control panel (see Figure 6-3 on page 6-5).

The other end of this cable is the P5 connector and is connected to the environmental card. The LCD control panel cable is keyed so that it can fit in only one way. Also, the red stripe on the cable aligns with pin 1 on the connector.

4. Insert the LCD control panel into the bay.

The LCD control panel is keyed so that it can fit in only one way.

5. Replace the four panhead screws to secure the LCD control panel.
6. Replace the front panel bezel.
7. Plug the AC power cord into the power outlet.
8. Turn on the filer and disk shelves.

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